LAKE ONTARIO STEWARDSHIP INDICATORS PROJECT: FINDINGS FROM PILOT SURVEYS OF ONTARIO RESIDENTS AND KEY LEADERS

October 1995

HDRU Series No. 95-3

Prepared by:

William F. Siemer, Danielle O. Dixon, and Barbara A. Knuth
Human Dimensions Research Unit
Department of Natural Resources
Cornell University

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W. F. Siemer, D. O. Dixon, and B. A. Knuth
Human Dimensions Research Unit
Department of Natural Resources
Cornell University

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Key words: barriers, behavior, environment, Great Lakes, incentives, intention, Lake Ontario, motivation, stewardship

ACKNOWLEDGMENTS

We express our thanks to the Ontario residents and key leaders who completed questionnaires for this study.

For their assistance with project development, sampling, instrument review, and report finalization, we extend special thanks to the members of the Binational Advisory Committee (Marna Gadoua, Sally Lerner, Nina-Marie Lister, Lester Milbrath, Lois New, and Jennifer Rae).

We thank Andy Gilman, Health Canada, and Paul Bertram, U.S. Environmental Protection Agency, for their assistance in encouraging institutional support to move this project forward, and Mo Hussain for his oversight role through Health Canada. We thank Joel O'Connor and the Ecosystem Objectives Workgroup, Responsible Stewardship Subcommittee for their insights in developing the direction for this project and helping articulate the policy need for the information to be produced. We thank Luc Pelletier, University of Ottawa, for sharing his developing work on environmental attitudes and motivation associated with the St. Lawrence ecosystem.

Members of the Human Dimensions Research Unit assisted in a variety of ways during the course of this study. Nancy Connelly and Jody Enck provided instrument reviews. Annie Adams assisted with data analysis. Margie Peech provided word-processing support.

We thank Jennifer Pultz and the New York Sea Grant Institute for permission to use the illustration that appeared on the cover of the resident and key leader surveys. The illustration was created by Susan Stone for a New York Sea Grant publication (Great Lakes: Great Gardening, Fact Sheet 1, 1993).

Funding for this research was provided by Health Canada Project No. K3428021 and United States Environmental Protection Agency Cooperative Agreement GL995436-01-0.

*** EXECUTIVE SUMMARY ***

PURPOSE AND OBJECTIVES

- Expand the conceptual basis for development of quantitative indicators of environmental stewardship and assess the applicability and value of questionnaire items used in other studies as potential stewardship indicators.
- Develop potential stewardship indicator measures, including identification of key concepts and creation of a methodology and survey instrument.
- Pilot test the measures of environmental stewardship for the general public and for key leaders, focusing on the Lake Ontario Basin.
- Pilot test measures of key leader perceptions of general public environmental stewardship, focusing on the Lake Ontario Basin.

METHODS

- We developed a questionnaire that explored stewardship motivators, behaviors, intentions, and barriers. We developed a second version of the questionnaire for use with key leaders. It included all the items from the first questionnaire, but also explored key leader perceptions of the general public's stewardship behaviors, incentives, and barriers.
- We conducted a mail survey with a random sample (n=660) of the general public in three census metropolitan areas and three census agglomeration areas in the Canadian portion of the Lake Ontario Basin.
- We conducted a mail survey with a nonrandom sample (n=350) of key leaders (government and quasi-government officials, scientists, educators, representatives of environmental organizations, and business managers) in the Canadian portion of the Lake Ontario Basin. Key leaders received the second version of our questionnaire.
- We performed statistical analyses on the data to determine significant differences between the general public and key leaders in their stewardship behaviors, motivators, intentions, and perceived barriers. In addition, summated scale scores were calculated for identical behaviors and intentions items to facilitate comparisons between these groups and determine how the data could be used to demonstrate a population's movement over time toward a set of targeted behavioral endpoints.

RESULTS AND DISCUSSION

- Response rates for the general public and key leader surveys were 54% and 72%, respectively.

Sociodemographic Characteristics

- Key leaders were significantly more likely than residents to be highly educated, female, of urban background, and have a household income above $90,000, Canadian.

Stewardship Motivations

- The majority of residents and key leaders were greatly concerned about the quality of the environment in Canada and in and around Lake Ontario.

- Reasons for engaging in stewardship actions included desires to protect the environment and accomplishing outcomes other than environmental protection (such as saving money). Reasons other than environmental protection were particularly important for residents, especially for actions related to energy and water use.

- Key leaders, as a group, tended to have more environmental concern than residents and hold reasons for engaging in stewardship that are more directly related to a desire to protect the environment. These strong desires to foster environmental protection, among both residents and key leaders, bode well for attaining future political support for environmental protection initiatives.

Stewardship Behaviors and Intentions

- Nearly all respondents had engaged in stewardship-related behaviors in the four resource sectors studied (energy use, water use, product purchase and disposal, political involvement). The greatest expression of stewardship actions were reported for the energy use and product purchase/disposal sectors. Fewer actions were taken related to political involvement or water use.

- The summary stewardship behavior score for residents was 70.8 (mean) or 71.0 (median), compared to a possible mid-range value of 86. The key leader score was 78.9 (mean) or 76.0 (median). Policy-makers need to determine appropriate target values for stewardship behaviors among the Basin population.

- Stewardship intentions were consistently higher in all resource sectors than actual stewardship behaviors reported, indicating greater commitment to stewardship than exhibited through behaviors. Generally, key leaders were more willing than residents to engage in stewardship behaviors.

- The summary stewardship intentions score for residents was 104.2 (mean) or 105.5 (median), compared to a possible mid-range value of 86. The key leader score was 116.3 (mean) or 117.0 (median). These values are higher than the summary scores for behaviors, measured on identical scales. Policy-makers should therefore be concerned with increasing potential incentives to encourage greater consistency between stewardship intentions and behaviors, while at the same time reducing the influence of barriers perceived to prevent adoption of stewardship behaviors.

- Key leaders were more willing than residents to pay additional consumer prices, taxes and fees each month if the revenue generated were used by businesses and governments to conserve the Lake Ontario environment.

- Key leaders were generally more willing than residents to make personal sacrifices (e.g., in personal convenience and level of comfort) for the environment.

Stewardship Incentives and Barriers

- Economic incentives (e.g., having lower utility bills, receiving product rebates) appear to be attractive to the public and so may have potential for successfully encouraging actions to protect or conserve the environment.

- Residents perceived a variety of barriers to stewardship behavior, including factors related to knowledge, information, and financial resources. Policy-makers should consider how to remove such barriers to result in greater consistency between stewardship intentions and behaviors among Basin residents.

Key Leader Perceptions of Residents' Behaviors, Incentives, and Barriers

- Key leaders underestimated residents' adoption of energy conservation behaviors and overestimated the attractiveness of some stewardship incentives and the importance of many potential stewardship barriers to residents. For informed public policy debates to occur, key leaders actively engaged in such debates must have a realistic understanding of citizen behaviors and attitudes toward a variety of potential incentives and perceived barriers. Without such understanding, public policy is likely to be ineffective and not directed toward meaningful outcomes.

RECOMMENDATIONS

- The results of this study should be interpreted with some caution regarding their applicability to the Canadian Lake Ontario Basin population as a whole, since sampling methods were not designed or intended to produce a sample representative of all Ontario residents.

- Since this study was designed as a pilot test to aid in developing a mechanism for measuring stewardship indicators Basin-wide and over the long-term, recommendations are focused on modifications to the survey instrument. Recommendations are divided into groups according to the primary concept areas measured in the survey instrument, as well as sociodemographic items and items related to key leader perceptions of the general public.

Sociodemographic Items

- Retain measures of respondent background characteristics (resident questionnaire items 16-25; key leader questionnaire items 21-32).

Stewardship Motivations

- Retain most or all measures of concerns and beliefs about the environment (resident questionnaire items 1-3). Consider additional response categories to provide greater differentiation between levels of concern.

- Retain all measures on the stewardship beliefs scale (resident questionnaire item 4). Consider additional items to provide a richer definition of stewardship and greater differentiation between respondents.

- In future instruments, reduce the stewardship motivation scale (resident questionnaire items 10-11) to 9-12 items: 3-4 indicators of internal motivation, 3-4 indicators of external motivation, and 3-4 indicators of amotivation.

Stewardship Behaviors and Intentions

- Further develop the stewardship behaviors/intentions scale to improve measurement of changes in people's behaviors and intentions over reasonable time periods (resident questionnaire items 5-7, and 13). Modifications to consider include adding more response categories to each item, creating more than five commitment levels, and/or changing the definitions associated with the five commitment levels. Behavior items also should be examined to ensure they reflect behaviors that are particularly relevant to stewardship needs in the Lake Ontario Basin.

- Revise items related to willingness to make personal lifestyle choices because they seem too ambiguous to provide reliable data (resident questionnaire item 14).

- Include an item in future instruments related to willingness-to-pay for environmental protection, as this will provide valuable information to policy makers. The item should be as specific as possible. The general item in the pilot instrument (item 15) should be revised. Moreover, researchers should make sure that variables such as income and education level are controlled when willingness-to-pay data are interpreted.

Stewardship Incentives and Barriers

- Retain stewardship incentives items (resident questionnaire items 8-9). Consider adding items measuring fines and penalties.

- Retain stewardship barriers items (resident questionnaire item 12), except the item measuring loss of personal freedom (resident questionnaire item 12d), but consider further development and addition of items representing major conceptual areas.

Key Leader Perceptions of Basin Residents

- Retain measures of key leader perceptions about residents' behaviors (key leader questionnaire items 16-17), but reassess whether energy conservation is the most important sector to be measuring for these purposes.

- Retain measures of key leader perceptions about residents' attitudes concerning stewardship incentives and barriers (key leader questionnaire items 18-19).

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INTRODUCTION

The Great Lakes Water Quality Agreement of 1978 between Canada and the United States, as amended in 1987, contained provisions for developing ecosystem objectives for each of the Great Lakes. In 1989, the two governments established the binational Ecosystem Objectives Work Group (EOWG) to accomplish that task.

The initial efforts of EOWG were focused on Lake Ontario. Objectives proposed for Lake Ontario included: perpetuating a healthy and diverse wildlife community; preventing significant levels of chemical contaminants in the waters, fauna, and flora of the Lake; and ensuring that human activities in and decisions about the Lake Ontario Basin reflect responsible stewardship (Bertram and Reynoldson 1992). Since the creation of EOWG, the International Joint Commission (IJC) also has initiated efforts to develop indicators of ecosystem health, including indicators related to stewardship. This report represents the initial effort to develop quantitative indicators of progress toward responsible stewardship, growing out of the work of EOWG and focusing on the Canadian portion of the Lake Ontario Basin.

The ability of governments to meet the various Lake Ontario ecosystem goals that have been identified depends, to a large degree, on developing common understandings and partnerships between the governments and the publics they serve. Without a citizenry that has adopted a responsible stewardship ethic, political, financial, and institutional support will not exist for initiatives such as the Lake Ontario Lakewide Management Plan and the Lake Ontario Toxics Management Plan. It is critical that governments understand (and do not just assume they understand) the environmental ethic of citizens in the Lake Ontario Basin.

The specific stewardship objective articulated by EOWG is that "human activities and decisions shall embrace environmental ethics and a commitment to responsible stewardship,"

reflecting EOWG's goal that "we as a society shall recognize our capacity to cause great changes in the ecosystem and we shall conduct our activities with responsible stewardship for the Lake Ontario Basin" (Bertram and Reynoldson 1992:94). The goal and objective imply important stewardship indicators should include measures of: (a) **human activities** that may reflect stewardship (stewardship behavior); (b) the type and extent of certain **ethical environmental beliefs** held by individuals, including decision-makers in positions of power and influence (stewardship motivators); and (c) **commitment to stewardship** (stewardship intentions). If any of those indicators are less than the acceptable endpoint, **barriers** must be identified that prevent attainment of responsible stewardship in the Basin (Knuth et al. 1993).

Shortly after the creation of EOWG, the Lake Ontario Responsible Stewardship Subcommittee was created to discuss steps toward operationalizing the articulated stewardship objective. By late 1992, 18 potential stewardship indicators had been identified by the Subcommittee. Those ranged from measures of toxicant loss from manufactured products to measures of discrete behaviors such as the degree of environmental volunteerism engaged in by the public.

By mid-1993, the work of the Stewardship Subcommittee led to a proposal for a pilot project that would mark the initial effort to create a system for monitoring progress toward widespread stewardship ethics and behavior in the Basin (Knuth et al. 1993). A Binational Advisory Committee was created to provide guidance for that effort. The Advisory Committee included academics (L. Milbrath [U.S.], S. Lerner [Can.], N. Lister [Can.]) and agency staff (L. New [U.S.], M. Gadoua [U.S.], J. Rae [Can.]).

This report represents the outcome from one stage of the pilot project. The focus of this effort to test potential stewardship indicators targeted the Canadian portion of the Lake Ontario Basin. The "sister" effort testing potential indicators in the United States portion of the

Basin is scheduled for late 1995, pending the office of Management and Budget review of the research instruments as required by statute.

Project Objectives

Several objectives are associated with this project. These include:

1. Through means of a literature review, expand the conceptual basis for development of quantitative indicators of environmental stewardship, and assess the applicability and value of questionnaire items used in other studies as potential stewardship indicators;

2. Develop potential stewardship indicator measures, including identification of key concepts and creation of a methodology and instrument for measurement;

3. Pilot test the measures of environmental stewardship (including components related to motivations, intentions, behaviors, and perceived barriers) for the general public and for key leaders, focusing on the Lake Ontario Basin; and

4. Pilot test measures of key leader perceptions of general public environmental stewardship, focusing on the Lake Ontario Basin.

Progress toward the first objective was reported in the March, 1994 document "Lake Ontario Stewardship Indicators Pilot Project: Literature Review" (Dixon et al. 1994), submitted to Health Canada and the U.S. Environmental Protection Agency. That literature review continues to be updated as we continue work in this area (Dixon et al., in press).

Progress on the last three objectives is represented by this report, but includes only the Canadian portion of the Lake Ontario Basin for reasons noted earlier. The fourth objective was included in this project in recognition of the need for decision-makers and those with authority and influence to understand citizen attitudes and behaviors related to environmental programs and policy decisions. If the perceptions about citizen attitudes and behaviors that are held by those in power differ from citizens' actual attitudes and behaviors, decision-makers may be making policies that cannot be implemented for lack of support, that are weaker than what could have been supported, or that may be in conflict with the citizens for whom they are supposed to be working. Bertram and Reynoldson (1992:92) noted that

ecosystem objectives "should be incorporated not only into agency programs but into public expectations." Objective four helps check the accuracy of key leaders' perceptions about those public expectations.

The next section of this report provides an overview of the conceptual foundation for measuring stewardship indicators, which underpins the measurement instrument used in the pilot survey. The Methods section that follows includes description of instrument development for each of the major conceptual areas, sampling protocol, and implementation and analysis procedures. The following section includes presentation and discussion of the results of the pilot survey, including specific implications and measurement issues for future indicator monitoring. The report concludes with a summary of the recommendations growing out of this study. The actual measurement instruments used in the pilot survey are included as appendices.

CONCEPTUAL FOUNDATION FOR STEWARDSHIP MEASURES

Literature Search Methods

In 1994, we conducted an extensive literature review in preparation for instrument development. We searched for citations concerning stewardship concepts and indicators in the most relevant of 180 databases available through the Cornell University library system (Figure 1).

We identified three primary key words and 17 secondary key words to use when searching each database (Figure 2). First, a primary keyword would be entered into the search command. The computer would identify the number of literature citations in that database that contained the keyword. If fewer than 200 citations were found, the researcher examined each reference and recorded the ones related to stewardship concepts, indicators of environmental stewardship, and protection and degradation of natural resources in the

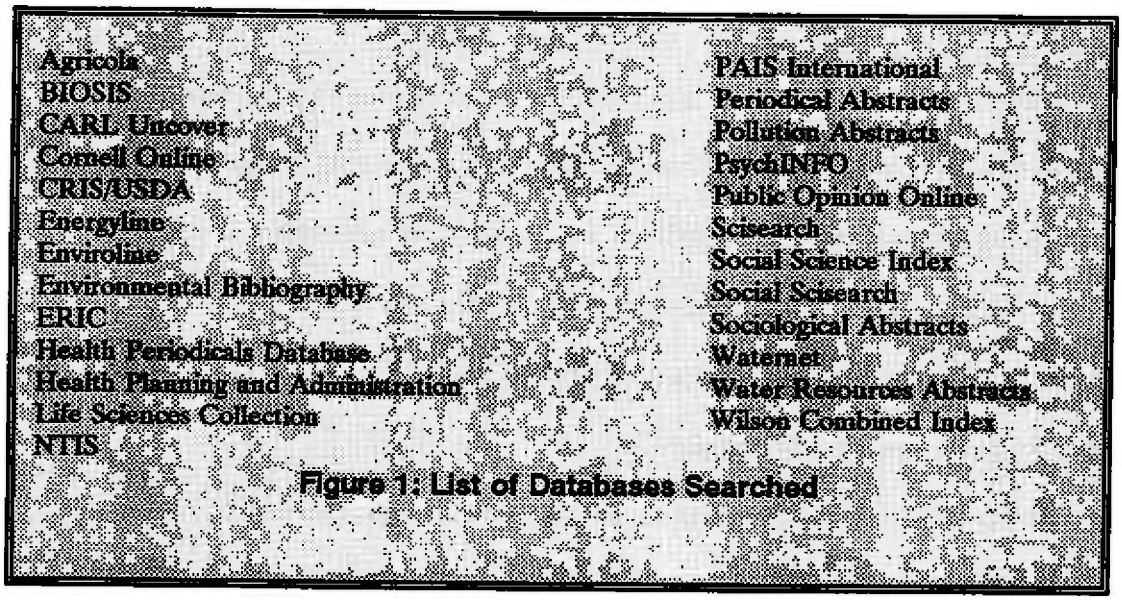

Figure 1: List of Databases Searched

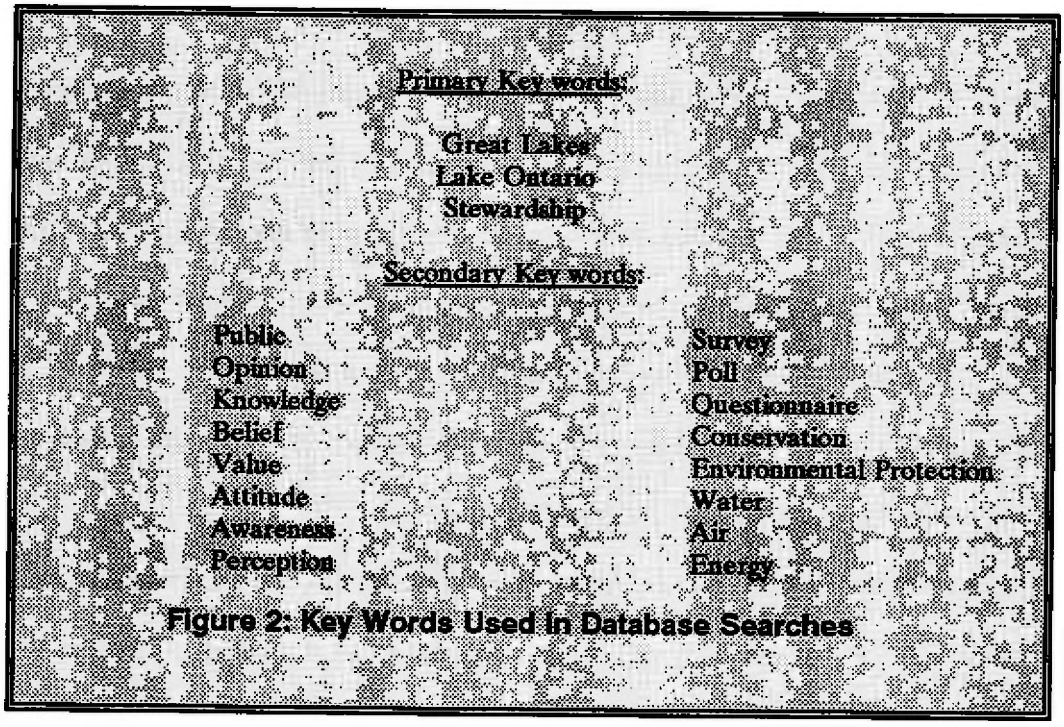

Figure 2: Key Words Used in Database Searches

Great Lakes Basin. If more than 200 citations were listed, the researcher entered each secondary keyword and recorded the appropriate references. After all of the databases were searched, the recorded citations were compiled and duplications were deleted.

The final list of references was divided into literature concerning concepts of environmental stewardship, books and articles related to indicators of environmental stewardship, and other citations. Citations listed in the first two categories were divided further into sources of primary importance and sources of secondary importance. Sources of primary importance that were available through the Cornell library system were located and reviewed. In addition, articles previously acquired by the Principal Investigator were reviewed.

Stewardship and Related Concepts

Although the idea of stewardship as an essential ingredient in the fields of environmental management and natural resource conservation is a relatively new concept (Decker et al. 1991), the doctrine of stewardship has existed for centuries. St. Augustine in the fifth century A.D. realized that people's natural concern for their descendants leads one generation to compromise its immediate interests for the sake of future generations. Today, people recognize that the concept of stewardship is related not only to physical and biological conservation (Anonymous 1990), but also to morality and ethics. According to Sample (cited in Kaufman 1992), conservation efforts will succeed only if the condition of ecosystems is improved for future generations; resource management focuses on "desired future resource conditions" rather than short-term production; and land stewardship consists of both a scientific base and a "moral imperative."

Environmentalists, economists, theologians, and others have proposed numerous definitions for the term stewardship. Some recurrent themes run through most of those definitions, including an ethic of personal responsibility and behavior based on reverence for the Earth, an obligation to future generations, a need for personal action and participation, and a commitment to use resources both wisely and efficiently (see for example Leopold 1977; Wilkinson 1991; diZerega 1992).

In 1949, Aldo Leopold's *A Sand County Almanac* was published. That collection of essays defined stewardship as a "land ethic". Leopold's land ethic placed primary concern on maintaining the integrity of the ecosystem. Leopold believed that a land ethic "changes the role of *Homo sapiens* from conqueror of the land to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such" (Leopold 1977:203). The land ethic implies that the integrity of the ecosystem, or community, as well as the welfare of both current and future generations should be considered when making land management decisions. This is evidenced in Leopold's frequently quoted statement, "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise" (Leopold 1977:224-225). Leopold's land ethic is often reflected in writings that promote stewardship of privately-owned lands (see for example Decker et al. 1991).

Parallels often are drawn between the notion of stewardship and various religious concepts, for example, the Christian concept of environmental management (Bratton 1983). Christians traditionally have viewed stewardship according to a hierarchical structure, with God at the top, humans in the middle holding the land in trust for both God and future generations, and the land at the bottom as an item that is owned and used (Ebenreck 1981). In practice, stewardship refers to the methods by which individuals acquire, use, and ultimately dispose of their resources. According to Bratton (1983), good stewardship is simply the wise use of resources. Although the idea of dominion over the Earth proposed by many Christian authors conflicts with definitions of stewardship espoused by the proponents of deep ecology (Sessions and Duvall 1985) and others, the Christian stewardship ethic coincides with these other philosophies in its tenet that the abuse of natural resources for short-term profits is unjust (Wilkinson 1991).

The stewardship model as defined by some authors has been criticized both by deep ecologists and Christians. Some deep ecologists do not support the stewardship model because it often includes the idea that natural resources exist primarily for human use and it does not distinguish between vital human needs and human desires (diZerega 1992). Similarly, some Christians believe the Church should adopt a "theology of interrelationship" to replace the stewardship model. According to this theology, the natural world is valuable "because of its relationship to God, rather than its utility for humanity" (Frame 1990:38). However, not all authors believe that the concept of stewardship is based on the assumption that nature exists for human purposes.

Many scientists and social scientists have defined the term stewardship, and have discussed their views concerning principles inherent in a stewardship philosophy. According to Giltmier (1990), a stewardship ethic is composed of 4 primary tenets: (1) scientific stewardship of the land leads to a sustainable future for the community and ensures that future generations will benefit from the land's resources; (2) the steward, through caring for the land, is providing more for the community than for himself; (3) sustainable stewardship focuses on long-term, continuing benefits rather than short-term profits; and (4) historically, land stewards have been viewed as intellectually and morally dominant because of their personal, physical commitments to the demands of the land and their reliance on scientific principles not generally understood by the layperson.

Concepts related to stewardship are evident in the "ecosystem approach" being promoted for management of the Great Lakes Basin. The 1978 Great Lakes Water Quality Agreement, as amended in 1987, defined the ecosystem as "the interacting components of air, land, water, and living organisms, including humans" (GLWQA, Article I(g)). The ecosystem approach recognizes that the various components of the environment are

interconnected, and therefore that environmental contamination or degradation in one area can cause problems in another. That concept requires all individuals whose activities may adversely affect the environment to recognize and reduce impacts. In practice, the ecosystem approach requires people to avoid actions that may directly or indirectly lead to contamination of the Lakes (Great Lakes Water Quality Board 1991). To fully implement the ecosystem approach for the Great Lakes Basin, governments must operationalize the ecosystem approach in resource management and regulatory programs, and individuals must assume personal responsibility to protect the ecosystems in which they live and ensure that their behaviors will not adversely affect the quality of the Great Lakes Basin (Hartig and Zarull 1992), i.e., they must be good stewards of the environment.

Based on our literature review of the stewardship concept and the goal and objectives originally articulated by EOWG, we have defined stewardship for the purposes of this project as *the moral obligation to care for the environment, and the actions undertaken to provide that care*. The moral obligation to care for the environment implies the existence of an ethic of personal responsibility, an ethic of behavior based on reverence for the Earth (i.e., respecting rather than destroying nature), and a sense of obligation to future generations. To effectively care for the environment, individuals must use it wisely and efficiently, in part by placing self-imposed limits on personal consumption and altering personal expectations, habits, and values.

Because behavior is influenced by a host of factors beyond the obligations a person feels, measuring **stewardship behavior** alone provides an incomplete assessment of the extent of stewardship in the Lake Ontario Basin. As noted in the definition of stewardship, a sense of obligation, or **motivation**, is an important component of stewardship, as is **intention**. Because intervening factors may prevent an individual's intentions from being realized as

stewardship behavior, an understanding of barriers to stewardship is necessary if one seeks to increase the prevalence of sound stewardship in the Lake Ontario Basin.

METHODS

This project was targeted at two different groups, residents and key leaders. We therefore developed two different measurement instruments. The first instrument was designed to collect information on behaviors, intentions, motivators, and behavioral incentives and barriers of Ontario residents. The second instrument was designed to collect identical information from key leaders in Ontario, and also assess key leader perceptions of residents' stewardship behavior, incentives, and barriers. In this section, we explain how those two instruments were developed, how surveys of Ontario residents and key leaders were implemented, and how data were analyzed.

Instrument Development

We used our review of stewardship literature (Dixon et al. 1994) as a foundation to develop four indicators of environmental stewardship: (1) stewardship motivators; (2) stewardship intentions; (3) stewardship behaviors; and (4) stewardship barriers/incentives. In addition, we developed several items for gathering background information from respondents for purposes of classification and description. Finally, we developed a series of items to facilitate comparisons between area residents' responses and how key leaders perceive area residents think and behave.

During the summer of 1994, draft questionnaires for the Ontario resident and key leader surveys were circulated for internal review by staff in the Human Dimensions Research Unit (HDRU) and external review by members of the Binational Advisory Committee. Review comments were incorporated into revised questionnaire drafts. We conducted overall instrument pretesting with 70 undergraduate students in the Cornell University course Natural

Resources 308, and 20 faculty and staff in the Cornell University Department of Natural Resources. We received 49 useable returns from students and 13 useable returns from faculty/staff, giving us a pretest group of 62 respondents. We also conducted a pretest with 10 members of the Finger Lakes Natural History Network specifically to assess perceived difficulty of doing 35 actions in our stewardship behaviors list. Pretest data were coded, analyzed, and discussed by HDRU staff. Analysis and interpretation of the pretest data were used to guide instrument finalization. The final instruments are included in Appendices A and B.

Background Variables

The instrument included measures of seven sociodemographic characteristics that previous studies (e.g., Olson 1981, Cunningham and Lopreto 1977, Olson and Goodnight 1978, Dunlap and Jones 1992) have associated with differences in environmental attitudes: age, sex, family structure, urban/rural background, education, income, and race (resident questionnaire items 16-23). We also included items that assessed home and car ownership to facilitate analysis of items that were applicable only to home or car owners (resident questionnaire items 24-25).

Stewardship Motivators

We used a reduced and modified set of items developed by Pelletier and others (Tuson et al. 1991, Pelletier et al. 1993) as measures of motivations to engage in stewardship behaviors (see Appendix C). Pelletier et al.'s 1993 Motivation Toward the Environment Scale (MTES) has 24 items, with four items in each of six motivational subscales. We developed a 14-item modification of the scale which has at least two items in each of six subscales (resident questionnaire items 10-11).

Based on our literature review, we developed a 4-item stewardship beliefs and values scale (resident questionnaire item 4). The items in that scale measure 4 perceptions: personal responsibility for environmental quality, obligation to future generations, need for self-imposed limits on product consumption, and a need to show respect for the environment.

We included items that assessed six other attitudes and beliefs that can be considered motivators to behave as an environmental steward (resident questionnaire items 1-2). We measured level of concern about the quality of the environment in and around Lake Ontario and in Canada. We asked respondents to rate the quality of the environment in and around Lake Ontario, in Canada, and in the world as a whole. We also assessed perceived trends in environmental quality in and around Lake Ontario in the past five years and the perceived link between personal health and environmental quality in and around Lake Ontario.

Stewardship Behaviors

With assistance from the Binational Advisory Committee, we developed 19 measures of behavior related to five stewardship commitment levels (Appendix D) and four resource sectors: water conservation, energy conservation/air quality, product purchase/disposal, and political involvement (resident questionnaire items 5-7) (Appendices E1-E4). Each measure represented a single resource sector and commitment level, with one exception: in the product purchase and disposal category, one item was chosen to represent both commitment levels three and five. The frequency with which individuals could engage in the various stewardship behaviors varied by measure. Thus, it was necessary to construct three different scales of items to encompass all of the measures. For 16 items, respondents were asked to report the frequency with which they had engaged in the particular behaviors during the past 12 months. For 10 items, respondents were asked to provide information about why they

took a particular action: to protect the environment, for some other reason (e.g., saving money), or for both environmental and other reasons.

Stewardship Intentions

In order to analyze differences between respondents' current stewardship behaviors and their behavioral intentions, we used the same set of items in the intentions and behaviors sections. The order and tense of items in the intentions section was changed. In this case, it was possible to include all 19 measures (Appendices E1-E4) in a single scale (resident questionnaire item 13). For each item, respondents were asked to provide information about why they would be willing to take a particular action: to protect the environment, for some other reason (e.g., saving money), or for both environmental and other reasons.

We also included items designed to measure respondents' willingness to make changes in their daily activities to help protect and conserve the Lake Ontario environment (resident questionnaire item 14). This set of items measured what people were willing to sacrifice (e.g., personal comfort, personal safety) in order to promote greater environmental protection.

Finally, we included a contingent valuation question to determine how much more money per month respondents would be willing to pay in prices, taxes, and fees for all the goods and services they use as consumers, if they knew that governments and businesses were using that extra money to help protect the Lake Ontario environment (resident questionnaire item 15). The categories provided ranged from no extra money to more than 250 dollars per month.

Stewardship Incentives and Barriers

We developed items to measure the perceived attractiveness of 10 monetary incentives to take actions that would protect or conserve the Lake Ontario environment

(resident questionnaire items 8-9). Nine of those were positive incentives (e.g., saving money). One of the items was a disincentive for regulatory noncompliance (i.e., establishing fines for violation of conservation regulations). The items were measured on a five-point scale ranging from "would not encourage me at all" to "would encourage me strongly." Respondents also were given an opportunity to list other incentives that would encourage them to protect and conserve natural resources.

We developed items to measure the perceived importance of 12 barriers preventing people from taking actions to protect or conserve the Lake Ontario environment (resident questionnaire item 12). Barriers were measured on a five-point scale ranging from "not important" to "very important." Items explored the importance of cultural barriers (e.g., peer pressure against expressing "green" behaviors), psychological barriers (e.g., belief that personal actions will have no influence), monetary barriers (i.e., perceived lack of money), sociodemographic barriers (age), and knowledge barriers (e.g., limited knowledge about environmental issues).

Key Leader Perceptions of Area Residents

We were interested in measuring the degree to which key leaders held accurate perceptions about Ontario residents' behaviors, their intentions to behave, and the personal importance they placed on potential barriers and incentives to be good stewards of the environment. We included 32 measures of key leader perceptions of Ontario residents (key leader questionnaire items 16-20). Each item was a restatement of an item used earlier in the questionnaire; key leaders were instructed to answer these items according to their perceptions of the average Basin resident.

We assessed key leader perceptions of residents' behaviors in only one resource sector: energy use. For items at commitment levels one and three through five, respondents

were asked to report the frequency they believed the average Basin resident had engaged in the particular behaviors during the past 12 months. For each of those items, key leaders also were asked to provide information about why they thought the average Basin resident took that particular action: to protect the environment, for some other reason (e.g., saving money), or for both environmental and other reasons. For commitment level two, key leaders were asked if they thought the typical Basin resident installed or maintained weather-proofing in his/her home.

We assessed key leader perceptions of residents' intentions using the same contingent valuation (i.e., willingness-to-pay) item used earlier in the questionnaire. We assessed key leader perceptions of the average Basin resident on the same 10 measures of stewardship incentives and the same 12 measures of stewardship barriers that they had answered personally. Again, items were identical with the exception of the introductory sentence.

Sampling

Identification of Ontario Resident Sample

The target population for the pilot study was adult residents of Ontario who lived in the Lake Ontario Basin. With the guidance of the Binational Advisory Committee, we selected six sampling locations to represent the Basin. The areas we selected were the census metropolitan areas (CMA's) of Hamilton, Toronto, and Kingston, and the census agglomeration areas (CA's) of Peterborough, Belleville, and Cobourg. Those areas were selected to represent a range of geographic locations and demographic characteristics.

A professional sampling firm (Survey Sampling, Inc.) was contracted to draw a total sample of 660 people. In each CMA or CA, a total of 110 names were drawn by computer from the pool of persons in that area who had an active, listed telephone number. It should

be noted that we sampled in a way that would facilitate pilot testing; we did not sample with the intention of using the data to make generalizations about the population of all adult residents in Ontario.

Identification of Ontario Key Leader Sample

We asked members of the Binational Advisory Committee to provide us with lists of "key leaders": people whose work potentially related to or affected the Lake Ontario Basin. Committee members were informed that we were interested in contacting a variety of individuals at various levels of stewardship commitment, not just individuals who were perceived to be good stewards (Appendix F). For the purposes of the Canadian pilot survey, we selected only those key leaders living in Canada. We included Canadians living outside the Basin if they were identified as individuals in positions that affected the environment within the Basin.

We categorized key leaders as: government officials, quasi-government representatives, business managers, leaders in environmental organizations, educators, or scientists. Key leaders in government included both elected and appointed officials (e.g., mayors, public health inspectors), government agency staff not involved in scientific research, and representatives of tribal governments (e.g., members of the Mohawk Council at Akwesasne). Quasi-government leaders included members of remedial action plan committees, community health centers, health service organizations, and the IJC. Business managers included persons associated with companies and corporations (e.g., DoFasco Inc.) as well as professional groups (e.g., Ontario Corn Producers Association). Key environmental leaders represented such organizations as Greenpeace, Ducks Unlimited, and Great Lakes United. Educators included directors of Boards of Education and School Boards, pre-kindergarten through twelfth grade teachers and university deans. Finally, scientists included

university-level professors in scientific disciplines, staff in government agencies who conducted research related to natural resources, and staff at non-government research institutions.

We received information for more than 600 Canadian key leaders after deletion of duplicate names, omission of organizations for which no contact name was provided, and reduction to a single member of any given household. Given cost constraints, we selected 350 individuals for our final key leader sample. We attempted to select an equal proportion of men and women in each key leader category. We included representatives of a variety of agencies and organizations, and as many towns and counties as possible. It should be noted that this sampling process was intended only to facilitate pilot testing; it was not intended to provide representative data on any of the individual key leader groups sampled.

Implementation and Analysis

We implemented our surveys of Ontario key leaders and residents in October-November 1994, using a method similar to the Dillman total design method (Dillman 1978). Each respondent received a cover letter and questionnaire. Nonrespondents received as many as three additional mailings: a reminder letter seven days after the first mailing; a letter and a replacement questionnaire 10 days after the second mailing; and a final reminder letter seven days after the third mailing. The samples and sampling strategy were not designed to provide generalizable findings about all Ontario residents. Thus, we did not weight the data or conduct any follow-up study to estimate potential nonrespondent bias.

The data from the resident and key leader surveys were analyzed as single strata (i.e., we did not use the data to make generalizations about individual geographic areas or key leader types). HDRU staff completed data coding and analysis using the Statistical Package for Social Sciences Software (SPSS Inc. 1986, 1988). Chi-square and Student's t statistics

were used for comparisons between groups (between group differences were tested at the $p < 0.05$ level of significance). Items with scales related to stewardship beliefs, motivators, barriers, and incentives were subjected to the SPSS procedure RELIABILITY to determine which items should be retained to achieve high scale reliability and low inter-item correlations and scale variance. Revised scales related to stewardship beliefs, motivators, barriers, and incentives were subjected to confirmatory factor analysis using the principal components method. For those scales where analysis identified meaningful factors, we also created grand means for all items in each factor as a measure by which to compare responses of Ontario residents and key leaders.

Scoring the Behaviors Scale

We developed four methods for combining data from the 19 behavior measures into an overall scale score or indicator (Appendix G). The method we recommend calculates a scale score for each respondent based on the frequency with which the respondent engaged in the behavior multiplied by the commitment level for that item. That method is represented by the equation:

$$B = \sum f_i \cdot c_i, \text{ where}$$

B = behavior
f_i = frequency
c_i = commitment level.

Respondents who answered "never", "no", "doesn't apply", or "not applicable" received a score of zero for that particular item. For resident questionnaire items 5 and 6, response choices two, three, and four were recoded as one, two, or three respectively, then multiplied by the item commitment level (from one to five). For resident questionnaire item 7, respondents who had engaged in the activity received a score equal to three times the item commitment level. The data presented in the results section are based on the use of this scoring method, which

treats ordinal scales as interval-ratio scales. We also conducted a t-test comparing the means for key leaders and residents for each score.

Scoring the Intentions Scale

We used essentially the same four scoring methods developed for the behavior items to calculate respondents' scale scores for these 19 measures (Appendix H). Each potential method of scoring intentions (and behavior) items has advantages and disadvantages (Appendix I). The method we recommend calculates a scale score, or indicator, for each respondent based on the respondent's willingness to engage in the behavior multiplied by the commitment level for that item. This method is represented by the equation:

$$I = \sum g_i \cdot c_i, \text{ where}$$

I = intention
g_i = willingness
c_i = commitment level.

Respondents who answered "not at all willing" or "doesn't apply" received a score of zero for that item. Response choices two, three, and four were recoded as one,two, or three respectively, then multiplied by the item commitment level (from one to five). The data presented in the results section are based on the use of this scoring method, which treats ordinal scales as interval-ratio scales. We also conducted a t-test comparing the means for key leaders and residents for each score.

RESULTS AND DISCUSSION

The Ontario resident survey (n=660) resulted in 191 undeliverable questionnaires, 23 unusable questionnaires and 252 completed returns, for an adjusted sample size of 469 and a response rate of 54%. The Ontario key leader survey (n=350) resulted in 23 undeliverable questionnaires, 6 unusable questionnaires and 235 completed returns, for an adjusted sample size of 327 and a response rate of 72%.

In this section, we describe results concerning stewardship motivators, behaviors, intentions, barriers and incentives, and key leader perceptions of the public. We present each subsection in the same format. First, findings from the resident and key leader surveys are presented and discussed. Next, we discuss scoring issues for the concept area. Third, we discuss measurement issues related to each concept area.

Respondent Background Characteristics

Findings and Implications: Residents and key leaders differed on most of the demographic characteristics measured. Mean age of residents was 51 years; mean age of key leaders was 47 years. Key leaders were significantly more likely than residents to be female, of urban background (Appendix J1), highly educated (Appendix J2), and have a household income above $90,000 (Appendix J3). No differences were found related to race of residents and key leaders (Appendix J4). The differences observed between the responses of residents and key leaders were consistent with previous research (e.g., Olson 1981, Dunlap and Jones 1992), which shows differences in environmental attitudes and behavior associated with gender, urban/rural background, education, and income.

Scoring Issues: There are no salient scoring issues to consider with regard to background characteristics.

Measurement Issues: The items we used to measure background characteristics have been developed in previous instruments. Thus, no significant changes in these items are recommended.

Stewardship Motivators

Concerns and Beliefs About the Environment

Findings and Implications: Most respondents were concerned about the quality of the environment in Canada and the quality of the environment in and around Lake Ontario. The majority of all respondents were greatly concerned. Key leaders were more likely than

residents to be greatly concerned about the quality of the environment in Canada and the quality of the environment in and around Lake Ontario (Table 1). Those findings are not surprising given previous research (Dunlap 1991, Dunlap and Jones 1992), which has revealed a relatively high level of awareness of environmental problems and concern about the quality of the environment among residents of the United States.

The majority of respondents perceived the quality of the environment in and around Lake Ontario and in the world as a whole as "neither poor nor good," "poor," or "very poor". Key leaders were more likely than residents to perceive that the quality of the environment in and around Lake Ontario had improved over the past 5 years (50.3% vs. 33.7%, respectively; $x^2 = 11.35$, 5 df, $p = 0.044$). However, key leaders were more likely than residents to perceive the current quality of Lake Ontario to be poor (Table 2). Residents and key leaders held more positive perceptions about the quality of the environment in Canada as a whole.

Table 1. Concerns about the environment expressed by residents and key leaders in Ontario, Canada.

Subject of Concern	Level of Concern (%)					
	Not at all Concerned	Somewhat Concerned	Greatly Concerned	Don't Know	P value	$\bar{x}^a$
The quality of the environment in Canada						
Residents (n=252)	1.2	38.5	58.7	1.6	0.002	2.59
Key leaders (n=234)	0.0	24.4	75.6	0.0		2.75
The quality of the environment in and around Lake Ontario						
Residents (n=245)	0.4	30.2	67.8	1.6	0.019	2.69
Key leaders (n=231)	0.0	21.6	78.4	0.0		2.78

[a]Mean based on a 3-point response scale: 1=not at all concerned, 2=somewhat concerned, 3=greatly concerned.

Key leaders were more likely than residents to believe the quality of the environment in Canada is good or very good (Table 2).

Scoring Issues: These items provide a very general indication of environmental concern. However, since most respondents appear to harbor some concern about the quality of the environment, additional response categories might prove useful as a way to discriminate differing levels of concern. The three-point response scale could be expanded to a five-point response scale.

Measurement Issues: Although they provide only a general indication of environmental concern, these items may be most useful as tools to engage the respondent in the task of questionnaire completion. We believe it would be useful to retain most or all of them in future instruments.

Table 2. Perceived quality of the environment expressed by residents and key leaders in Ontario, Canada.

Geographic Location	Perceived Environmental Quality (%)							
	Very Poor	Poor	Neither Poor nor Good	Good	Very Good	Don't Know	P value	$\bar{x}^a$
In and around Lake Ontario								
Residents (n=249)	4.4	30.9	38.6	20.9	1.2	4.0	0.002	2.83
Key leaders (n=235)	7.7	37.4	34.0	19.1	1.3	0.4		2.69
In Canada as a whole								
Residents (n=246)	0.0	35.4	42.3	3.3	3.3	3.3	<0.001	3.34
Key leaders (n=235)	1.7	15.7	23.0	48.5	10.6	0.4		3.51
In the world as a whole								
Residents (n=248)	11.3	49.2	23.4	6.5	0.8	8.9	0.280	2.30
Key leaders (n=234)	12.0	52.6	25.2	6.0	0.9	3.4		2.29

[a]Mean based on a 5-point scale: 1=very poor, 2=poor, 3=neither good nor poor, 4=good, 5=very good.

Stewardship Scale

Findings and Implications: The majority of residents and key leaders described all four stewardship beliefs as beliefs they personally held to be very or extremely important (Table 3). These findings are consistent with previous research (Dunlap 1991), which has revealed a relatively high level of awareness of environmental problems and concern about

Table 3. Resident and key leader responses to the 4-item stewardship motivators index.

Stewardship Beliefs	Level of Personal Importance (%)					
	Not at all Important	Moderately Important	Very Important	Extremely Important	P value	$\bar{x}^a$
Taking responsibility for how my actions may affect the environment.						
Residents (n=250)	0.8	19.6	57.2	22.4	<0.001	3.01
Key leaders (n=236)	0.4	10.2	50.0	39.4		3.28
Acting as a caretaker of the environment for future generations.						
Residents (n=248)	0.4	21.0	50.0	28.6	<0.001	3.07
Key leaders (n=236)	0.0	9.3	44.5	46.2		3.37
Limiting myself so that I use natural resources in a wise and efficient manner.						
Residents (n=246)	0.0	21.1	56.5	22.4	0.004	3.01
Key leaders (n=235)	0.9	16.6	46.8	35.7		3.17
Showing a sense of respect for the earth.						
Residents (n=249)	0.0	14.1	46.6	39.4	<0.001	3.25
Key leaders (n=233)	0.0	3.0	39.1	57.9		3.55

[a]Mean based on a 4-point scale: 1=not at all important, 2=moderately important, 3=very important, 4=extremely important.

the quality of the environment. Survey findings have documented a growing proportion of publics who are willing to be identified as "environmentalists."

Scoring Issues: The four-item stewardship index had an alpha of 0.85, indicating an acceptable level of internal consistency as a measurement scale. Reliability analysis indicated that internal consistency would not be improved by deleting items. Both residents and key leaders scored at the high end on the stewardship beliefs scale. However, the mean score for residents (3.08) was significantly lower than for key leaders (3.34) ($t = 4.97$, 488 df, $p < 0.001$).

Measurement Issues: The stewardship belief scale appears to provide valuable information. We believe it should be retained in future instruments. However, future users also should consider adding items to reflect a richer definition of stewardship and to provide better differentiation between respondents.

Pelletier's Motivation Scale

Findings and Implications: For many residents and key leaders, several personal beliefs served as motivations to take actions that help protect and conserve the Lake Ontario environment (Table 4). Members of both groups were likely to get pleasure from contributing to a healthy environment, feel like they were doing something wrong when they did not help protect the environment, and believe that helping to protect the lake Ontario Environment is a sensible thing to do.

Overall, key leaders were more likely than residents to hold strong beliefs that may motivate environmental stewardship behaviors. Key leaders were more likely to get pleasure from contributing to the environment and to believe that being conscious of the environment is a part of their identity. Key leaders also were more likely to say they liked the recognition they get from doing things to protect the environment.

Table 4. Resident and key leader responses to the general motivations index.

Motivator	Degree to Which Statement Corresponds to Personal Beliefs (%) Not At All			Moderately			Exactly	X^2	P value	$\bar{x}^a$
I get pleasure from contributing to a healthy environment around Lake Ontario.										
Residents (n=247)	6.1	6.5	7.7	31.6	18.2	10.9	19.0	32.30	<0.001	4.58
Key leaders (n=230)	0.9	3.0	6.1	20.0	19.1	21.7	29.1			5.35
My friends and relatives will be upset if I don't act in an environmentally friendly way.										
Residents (n=246)	36.6	11.8	12.2	19.1	9.3	5.7	5.3	11.83	0.065	2.91
Key leaders (n=231)	32.0	19.5	16.0	14.7	11.7	3.0	3.0			2.76
I'd feel like I was doing the wrong thing if I didn't help protect the Lake Ontario environment.										
Residents (n=247)	4.9	5.3	6.1	19.0	19.0	17.4	28.3	7.29	0.294	5.08
Key leaders (n=231)	4.8	3.5	3.5	15.6	22.9	24.2	25.5			5.23

Table 4. Cont.

Motivator	Degree to Which Statement Corresponds to Personal Beliefs (%) Not At All			Moderately			Exactly	X^2	P value	$\bar{x}^a$
I believe helping to protect the Lake Ontario environment is a sensible thing to do.										
Residents (n=248)	1.6	1.6	2.8	10.9	18.1	21.8	43.1	8.71	0.19	5.80
Key leaders (n=230)	0.0	0.9	2.6	6.1	19.1	26.5	44.8			6.02
Being conscious of the Lake Ontario environment has become an important part of who I am.										
Residents (n=246)	13.8	9.8	11.0	23.6	17.9	8.9	15.0	20.62	0.002	4.09
Key leaders (n=231)	6.5	9.1	11.3	16.5	15.6	16.5	24.7			4.73
I like the feeling I get when I do things that help protect the Lake Ontario environment.										
Residents (n=242)	9.9	7.4	13.2	22.7	14.9	11.2	20.7	5.91	0.433	4.41
Key leaders (n=230)	5.3	6.5	12.6	22.6	16.5	16.1	20.4			4.69

Table 4. Cont.

Motivator	Degree to Which Statement Corresponds to Personal Beliefs (%) Not At All						Exactly	X^2	P value	$\bar{x}^a$
I would feel guilty if I didn't do things in a way that helps protect the Lake Ontario environment.										
Residents (n=241)	9.5	5.4	8.3	25.3	15.4	11.6	24.5	14.03	0.029	4.64
Key leaders (n=230)	11.3	9.1	13.0	17.8	16.5	16.1	16.1			4.31
I like the recognition I get from other people when I help protect the Lake Ontario environment.										
Residents (n=242)	41.7	11.6	12.8	17.4	5.4	3.7	7.4	13.43	0.030	2.74
Key leaders (n=231)	30.7	18.6	17.3	15.2	6.9	6.5	4.8			2.87
Protecting the Lake Ontario environment is the way I've chosen to contribute to a better quality of life.										
Residents (n=238)	15.1	10.5	8.8	18.9	16.8	13.9	16.0	6.17	0.404	4.17
Key leaders (n=231)	8.7	10.0	9.5	17.3	18.6	18.2	17.7			4.53

Table 4. Cont.

Motivator	Degree to Which Statement Corresponds to Personal Beliefs (%) Not At All					Moderately	Exactly	X^2	P value	$\bar{x}^a$
I believe that taking care of the Lake Ontario environment is really part of taking care of myself.										
Residents (n=241)	9.5	8.7	9.5	21.6	16.2	11.6	22.8	16.82	0.009	4.52
Key leaders (n=231)	5.6	7.8	6.1	13.4	18.2	21.2	27.7			5.05
I believe the quality of the environment around Lake Ontario has an effect on my personal health.										
Residents (n=244)	4.9	4.5	4.9	10.7	18.0	18.0	38.9	1.52	0.95	5.42
Key leaders (n=230)	4.8	4.3	5.2	10.4	15.7	22.2	37.4			5.44
I don't believe my personal actions do harm to the Lake Ontario environment.										
Residents (n=247)	30.0	10.1	7.7	18.6	12.6	8.9	12.1	48.49	<0.001	3.49
Key leaders (n=230)	47.8	22.6	4.8	11.3	6.5	3.5	3.5			2.30

Table 4. Cont.

Motivator	Degree to Which Statement Corresponds to Personal Beliefs (%) Not At All			Moderately			Exactly	X^2	P value	$\bar{x}^a$
I don't feel that my personal actions do much to protect the Lake Ontario environment.										
Residents (n=246)	30.5	11.4	11.8	24.0	11.8	3.7	6.9	38.06	<0.001	3.14
Key leaders (n=230)	39.6	26.1	12.2	10.9	6.5	2.6	2.2			2.35
I believe scientists will develop new technologies so there is no need to conserve natural resources (e.g., water, energy)										
Residents (n=245)	58.4	13.1	11.0	9.8	2.0	2.0	3.7	33.61	<0.001	2.05
Key leaders (n=231)	69.7	21.6	3.5	3.5	0.0	0.4	1.3			1.49

[a]Mean based on 7-point response scale: 1=does not correspond at all, 4=moderately corresponds, 7= corresponds exactly.

Scoring Issues: Our 14 item motivation index, based on work by Pelletier, had an alpha of 0.861, indicating an acceptable level of internal consistency. Reliability analysis indicated that internal consistency could be improved marginally by deleting two items related to "amotivation" (Appendix K). Based on those results, factor analysis was conducted with 14 items.

In the 14 item analysis three principal components (i.e., factors) were identified with eigenvalues greater than one. Those three components accounted for 65% of the variance when analysis was conducted with all data. Among both groups some items loaded high on both factors. All of the items that loaded on factor one could be described as internal psychological motivators. Items in factor two related to amotivation. Two items in the third factor related to what Pelletier labelled external regulation (i.e., behavior performed because of an external system of reward, punishment, or constraint) (Table 5).

Measurement Issues: We had expected the analysis to identify Pelletier's six motivation factors (i.e., intrinsic motivation, amotivation, and four types of extrinsic motivation [external regulation, introjection, identification, and integration]). Our results supported the notion of intrinsic, extrinsic, and amotivation factors, but did not discriminate subdomains within the extrinsic motivation area. It is possible that respondents did not make the distinctions we expected, or that we did not include enough items on extrinsic motivation to obtain clear results on the domains.

Using our 14-item version of Pelletier et al.'s motivation scale offers a means to gain important insights about stewardship motivations. It is valuable for policy-makers to know whether stewardship motivations are internal, external, or absent (amotivation). However, the scale we developed may provide an unnecessary level of detail on internal motivations.

Table 5. Factor loadings for motivations scale with 14 items (resident and key leader data combined).

Variable Description	Factor Loading
Factor 1 (43.8% of variance) (Internal Psychological Motivators)	
I get pleasure from contributing to a healthy environment around Lake Ontario.	0.7005
I'd feel like I was doing the wrong thing if I didn't help protect the Lake Ontario environment.	0.7945
I believe helping to protect the Lake Ontario environment is a sensible thing to do.	0.8054
Being conscious of the Lake Ontario environment has become an important part of who I am.	0.7461
I like the feeling I get when I do things that help protect the Lake Ontario environment.	0.7489
I would feel guilty if I didn't do things in a way that helps protect the Lake Ontario environment.	0.7238
Protecting the Lake Ontario environment is the way I've chosen to contribute to a better quality of life.	0.7524
I believe that taking care of the Lake Ontario environment is really part of taking care of myself.	0.7979
I believe the quality of the environment around Lake Ontario has an effect on my personal health.	0.7294
Factor 2 (8.3% of variance) (External Regulation)	
My friends and relatives will be upset if I don't act in an environmentally friendly way.	0.7334
I like the recognition I get from other people when I help protect the Lake Ontario environment.	0.7291
I believe scientists will develop new technologies so there is no need to conserve natural resources (e.g., water, energy).	0.5680
Factor 3 (11.8% of variance) (Amotivation)	
I don't believe my personal actions do harm to the Lake Ontario environment.	0.7334
I don't feel that my personal actions do much to protect the Lake Ontario environment.	0.7291

Further modification of the scale we piloted may reduce its length without compromising its value for policy-making. We recommend that future instruments include a motivation scale with nine-12 items: three-four indicators of internal motivation, three-four indicators of extrinsic motivation, and three-four indicators of amotivation.

Stewardship Behaviors and Intentions

The results of the behaviors and intentions components of the questionnaire are discussed together in this section of the report to facilitate comparisons between items included in these categories. Note that the concept area "behaviors" is represented by survey questions 5-7 and the concept area "intentions" is represented by survey questions 13-15.

Findings and Implications: We examined the frequency with which respondents had taken any of 19 actions related to energy use, water use, product purchase/disposal, and political involvement, as well as respondents' reasons for taking actions. Data pertaining to those items are included in Tables 6-12. Nearly all residents and key leaders who responded (over 98%) had taken some actions related to energy use, water use, and product purchase/disposal. Fewer residents and key leaders (61% and 84%, respectively) had taken any political actions.

For the following behaviors, key leaders were significantly more likely than residents either to have engaged in the particular behavior or to engage in that behavior frequently: using energy efficient light bulbs, using alternative sources of transportation, signing a petition asking for increased environmental protection, urging their places of business to act in "environmentally-friendly" ways, writing a letter to a government representative expressing an opinion about an environmental program or policy, and helping campaign for a political candidate who has a pro-environment platform.

Table 6. Energy use behaviors exhibited in the preceding 12-month period by residents and key leaders.

Behavior	Frequency of Behavior in Last 12 Months					
	Never	Some/little of the time	Moderate amount of the time	Most/all of the time	P value	$\bar{x}^a$
I turned off the lights when no one was in a room.						
Residents (n=251)	0.4	2.8	16.3	80.5	0.158	2.76
Key leaders (n=235)	0.0	0.4	17.4	82.1		2.81
I used low wattage energy efficient light bulbs in my home.						
Residents (n=247)	20.2	27.1	27.9	24.7	0.017	1.57
Key leaders (n=233)	9.9	32.2	30.5	27.5		1.75
During the winter, I kept my thermostat at 15°C (60°F) or lower at night.						
Residents (n=249)	35.7	13.3	14.9	36.1	0.420	1.51
Key leaders (n=233)	32.2	13.3	5.6	42.9		1.65
I used different types of transportation rather than personally driving a car (e.g., bike, walk, car-pool, bus).						
Residents (n=247)	30.8	36.0	23.9	9.3	<0.001	1.11
Key leaders (n=234)	17.5	35.0	27.8	19.7		1.49
			No	Yes	P value	
I installed or maintained weatherproofing such as caulking, weatherstripping, storm windows, etc.						
Residents (n=250)			12.0	88.0	0.115	
Key leaders (n=235)			17.0	83.0		

[a]Mean is based on a 4-point response scale: 1=never, 2=some/little of the time, 3=moderate amount of the time, 4=most/all of the time.

Table 7. Reasons for energy use behaviors exhibited in the preceding 12-month period by residents and key leaders.

Behavior	Reason For Taking Action				
	To Protect the Environment	Other Reason	Both Reasons	X^2	P value
I turned off the lights when no one was in a room.					
Residents (n=239)	12.6	33.2	55.2	9.49	0.008
Key leaders (n=227)	13.2	19.8	67.0		
I used low wattage energy efficient light bulbs in my home.					
Residents (n=182)	22.5	26.9	50.5	7.13	0.028
Key leaders (n=193)	32.6	17.6	49.7		
During the winter, I kept my thermostat at 15°C (60°F) or lower at night.					
Residents (n=149)	12.8	36.9	50.3	11.43	0.003
Key leaders (n=147)	10.9	20.4	68.7		
I used different types of transportation rather than personally driving a car (e.g., bike, walk, car-pool, bus).					
Residents (n=152)	13.2	47.4	39.5	21.69	<0.001
Key leaders (n=182)	24.2	23.6	52.2		

Table 8. Water use behaviors exhibited in the preceding 12-month period by residents and key leaders.

Behavior	Frequency of Behavior in Last 12 Months					
	Never	Some/little of the time	Moderate amount of the time	Most/all of the time	P value	$\bar{x}^a$
While brushing my teeth, I turned off the water instead of letting it run.						
Residents (n=249)	15.7	19.7	18.1	46.6	0.087	1.95
Key leaders (n=233)	10.7	18.9	13.3	57.1		2.16
I repaired faucets that leaked or dripped within a day or two of when I noticed the leak.						
Residents (n=251)	14.7	9.2	19.5	56.6	0.001	2.17
Key leaders (n=235)	31.1	14.5	19.1	35.3		1.58
I collected shower and dishwater to use in flushing toilets instead of using fresh water.						
Residents (n=249)	95.6	2.8	1.2	0.4	0.317	0.06
Key leaders (n=234)	97.9	1.7	0.0	0.4		0.03

	Not At All	Once	Twice	>Twice	P value
I helped clean up a local beach or stream.					
Residents (n=249)	79.3	9.8	3.3	5.7	0.011
Key leaders (n=234)	69.5	14.2	3.4	12.9	

	No	Yes	P value
I installed or maintained one or more low-flow water faucets or shower heads.			
Residents (n=250)	29.6	70.4	0.223
Key leaders (n=235)	24.7	75.3	

[a]Mean is based on a 4-point response scale where 1=never, 2=some/little of the time, 3=moderate amount of the time, 4=most/all of the time.

Table 9. Reasons for water use behaviors exhibited in the preceding 12-month period by residents and key leaders.

Behavior	Reason For Taking Action				
	To Protect the Environment	Other Reason	Both Reasons	X^2	P value
While brushing my teeth, I turned off the water instead of letting it run.					
Residents (n=191)	31.4	28.3	40.3	93.30	0.009
Key leaders (n=194)	42.8	16.5	40.7		
I repaired faucets that leaked or dripped within a day or two of when I noticed the leak.					
Residents (n=195)	12.3	40.0	47.7	4.30	0.116
Key leaders (n=152)	16.4	29.6	53.9		
I collected shower and dishwater to use in flushing toilets instead of using fresh water.					
Residents (n=10)	50.0	30.0	20.0	0.69	0.705
Key leaders (n=5)	40.0	20.0	40.0		

Table 10. Product purchase and disposal behaviors exhibited in the preceding 12-month period by residents and key leaders.

Behavior	Frequency of Behavior in Last 12 Months					
	Never	Some/little of the time	Moderate amount of the time	Most/all of the time	P value	$\bar{x}$[a]
I used paper scraps for notes and memos.						
Residents (n=249)	8.4	18.5	22.9	50.2	0.231	2.14
Key leaders (n=234)	4.7	17.5	20.1	57.7		2.30
I disposed of motor oil, grease, and chemicals at an approved waste collection site.						
Residents (n=246)	28.5	4.9	6.5	60.2	0.644	1.98
Key leaders (n=235)	32.3	6.4	6.4	54.9		1.83
When a choice existed, I purchased an alternative to a toxic household product.						
Residents (n=246)	7.7	14.2	36.6	41.5	0.383	2.11
Key leaders (n=235)	8.1	13.6	29.8	48.5		2.18
			No	Yes	P value	
I repaired major appliances (e.g., washer, dryer) rather than replacing them with new appliances.						
Residents (n=250)			27.6	31.5	0.347	
Key leaders (n=235)			72.4	68.5		

[a]Mean is based on a 4-point response scale: 1=never, 2=some/little of the time, 3=moderate amount of the time, 4=most/all of the time.

Table 11. Reasons for product purchase and disposal behaviors exhibited in the preceding 12-month period by residents and key leaders.

Behavior	Reason For Taking Action				
	To Protect the Environment	Other Reason	Both Reasons	X^2	P value
I used paper scraps for notes and memos.					
Residents (n=209)	30.1	26.3	43.5	27.20	<0.001
Key leaders (n=210)	49.0	9.0	41.9		
I disposed of motor oil, grease, and chemicals at an approved waste collection site.					
Residents (n=165)	68.5	6.1	25.5	2.41	0.299
Key leaders (n=148)	75.7	3.4	20.9		
When a choice existed, I purchased an alternative to a toxic household product.					
Residents (n=210)	58.1	13.8	28.1	16.74	0.002
Key leaders (n=205)	76.1	5.4	18.5		

Table 12. Political behaviors exhibited in the preceding 12-month period by residents and key leaders.

Action	Frequency of Action					
	Not At All	Once	Twice	>Twice	P value	$\bar{x}^a$
I signed a petition asking for increased environmental protection in and around the Lake Ontario environment.						
Residents (n=247)	79.4	14.2	2.0	4.5	0.021	0.31
Key leaders (n=234)	70.1	15.4	6.4	8.1		0.52
I voted for political candidates because of their proposed environmentally-conscious policies.						
Residents (n=243)	73.3	18.1	3.7	4.9	0.197	0.40
Key leaders (n=233)	64.4	22.7	6.0	6.9		0.55
I urged my place of business to take steps to operate in a more environmentally-friendly way.						
Residents (n=246)	61.8	9.3	5.3	23.6	<0.001	0.90
Key leaders (n=236)	25.4	14.4	11.9	48.3		1.83
I wrote a letter to a government representative expressing my opinion about an environmental program or policy.						
Residents (n=250)	89.2	5.2	2.4	3.2	<0.001	0.19
Key leaders (n=233)	62.2	10.3	6.0	21.5		0.86
I helped campaign for a political candidate because he/she supports protective environmental actions.						
Residents (n=248)	91.9	4.4	0.8	2.8	0.017	0.14
Key leaders (n=229)	83.4	9.2	3.9	3.5		0.27

[a]Mean is based on a 4-point response scale: 1=never, 2=some/little of the time, 3=moderate amount of the time, 4=most/all of the time.

For items related to energy use and water use, respondents tended to engage in environmental stewardship behaviors for both environmental and other reasons. For items related to product purchase/disposal, respondents were more likely to engage in behaviors for environmental reasons. Overall, residents were more likely than key leaders to indicate that they took action for reasons other than protecting the environment.

We also asked respondents how willing they would be to engage in any of the same 19 stewardship behaviors over the next 12 months, as well as their reasons for taking action (Tables 13-20). Key leaders were more willing than residents to take a number of actions, including: using alternative sources of transportation, turning off the water while brushing their teeth, helping with a beach/stream clean-up, using paper scraps for notes, signing a petition asking for increased environmental protection, voting for political candidates because of their pro-environment platforms, urging their places of business to act in "environmentally-friendly" ways, and writing a letter to a government representative expressing an opinion about an environmental program or policy.

Across the four resource sectors, respondents generally were willing to engage in stewardship behaviors either for environmental reasons or for both environmental and other reasons. Overall, residents were more likely than key leaders to indicate that they would be willing to take action for reasons other than protecting the environment. Degree of willingness tended to decrease as required commitment level increased within a given resource sector, but the trend was not clear cut. The trend was most evident in the resource sectors of water use and political action.

Table 21 represents the summary statistics associated with the scale score developed for the set of 19 behavior and intention items; the summary statistics for the alternative scores are included in Appendix L. According to the results of t-tests comparing the mean scale

Table 13. Energy use intentions of residents and key leaders.

Behavior	Willingness to Take Action in Next 12 Months					
	Not at All	Somewhat	Moderately	Very	P value	$\bar{x}^a$
Turn off the lights when no one is in a room.						
Residents (n=249)	1.2	1.2	6.8	90.8	0.815	3.88
Key leaders (n=234)	0.9	0.9	5.1	93.2		3.93
Use low wattage energy efficient light bulbs in my home.						
Residents (n=245)	5.7	9.8	20.0	64.5	0.167	3.50
Key leaders (n=233)	3.4	6.4	16.7	73.4		3.66
During the winter, keep my thermostat at 15°C (60°F) or lower at night.						
Residents (n=244)	24.6	18.0	16.8	40.6	0.318	2.82
Key leaders (n=234)	23.5	17.9	11.5	47.0		2.85
Install or maintain weather-proofing in my home, such as caulking, weatherstripping, storm windows, etc.						
Residents (n=246)	11.8	2.8	10.2	75.2	0.062	3.82
Key leaders (n=233)	6.9	0.9	8.2	84.1		3.87
Mainly use different types of transportation rather than personally driving a car (e.g., bike, walk, car pool, bus).						
Residents (n=247)	26.7	20.6	24.7	27.9	0.002	2.76
Key leaders (n=234)	15.8	26.5	19.2	38.5		2.95

[a]Mean is based on a 4-point response scale: 1=not at all willing, 2=somewhat willing, 3=moderately willing, 4=very willing.

Table 14. Reasons for energy use intentions of residents and key leaders.

Behavior	Reason For Taking Action				
	To Protect the Environment	Other Reason	Both Reasons	X^2	P value
Turn off the lights when no one is in a room.					
Residents (n=239)	14.2	24.3	61.5	14.96	<0.001
Key leaders (n=225)	15.1	10.7	74.2		
Use low wattage energy efficient light bulbs in my home.					
Residents (n=215)	23.7	15.8	60.5	4.43	0.109
Key leaders (n=204)	29.9	9.8	60.3		
During the winter, keep my thermostat at 15°C (60°F) or lower at night.					
Residents (n=166)	20.5	24.7	54.8	6.22	0.044
Key leaders (n=164)	25.6	14.0	60.4		
Install or maintain weather-proofing in my home, such as caulking, weatherstripping, storm windows, etc.					
Residents (n=208)	13.5	23.6	63.0	13.27	0.001
Key leaders (n=203)	18.7	10.3	70.9		
Mainly use different types of transportation rather than personally driving a car (e.g., bike, walk, car pool, bus).					
Residents (n=172)	22.1	25.6	52.3	9.52	0.008
Key leaders (n=181)	26.5	12.7	60.8		

Table 15. Water use intentions of residents and key leaders.

Behavior	Willingness to Take Action in Next 12 Months					
	Not at All	Somewhat	Moderately	Very	P value	$\bar{x}$[a]
While brushing my teeth, turn off the water instead of letting it run.						
Residents (n=247)	7.3	13.4	12.1	67.2	0.0128	3.45
Key leaders (n=234)	3.4	6.4	13.7	76.5		3.66
Install or maintain one or more low-flow water faucets or shower heads in my home.						
Residents (n=243)	13.6	9.2	18.5	59.7	0.368	3.50
Key leaders (n=234)	15.4	7.7	12.8	64.1		3.51
Repair faucets that leak or drip within a day or two of noticing the leak.						
Residents (n=250)	6.4	2.8	12.8	78.0	0.079	3.80
Key leaders (n=233)	4.7	7.7	14.2	73.4		3.64
Help clean up a local beach or stream.						
Residents (n=244)	21.3	24.2	27.9	26.6	<0.001	2.73
Key leaders (n=234)	13.2	23.1	17.5	46.2		3.04
Collect shower and dishwater to use in flushing toilets instead of using fresh water.						
Residents (n=245)	71.8	15.5	7.3	5.3	0.523	1.52
Key leaders (n=232)	67.7	17.7	6.5	8.2		1.56

[a]Mean is based on a 4-point response scale: 1=not at all willing, 2=somewhat willing, 3=moderately willing, 4=very willing.

Table 16. Reasons for water use intentions of residents and key leaders.

Behavior	Reason For Taking Action				
	To Protect the Environment	Other Reason	Both Reasons	X^2	P value
While brushing my teeth, turn off the water instead of letting it run.					
Residents (n=219)	32.0	14.6	53.4	4.54	0.103
Key leaders (n=208)	41.3	10.6	48.1		
Install or maintain one or more low-flow water faucets or shower heads in my home.					
Residents (n=200)	21.5	20.0	58.5	8.42	0.148
Key leaders (n=189)	24.9	9.5	65.6		
Repair faucets that leak or drip within a day or two of noticing the leak.					
Residents (n=226)	16.8	22.6	60.6	10.33	0.005
Key leaders (n=214)	21.5	11.2	67.3		
Help clean up a local beach or stream.					
Residents (n=182)	63.2	7.1	29.7	4.31	0.115
Key leaders (n=177)	72.9	4.0	23.2		
Collect shower and dishwater to use in flushing toilets instead of using fresh water.					
Residents (n=64)	51.6	12.5	35.9	4.43	0.108
Key leaders (n=69)	66.7	4.3	29.0		

Table 17. Product purchase and disposal intentions of residents and key leaders.

Behavior	Willingness to Take Action in Next 12 Months					
	Not at All	Somewhat	Moderately	Very	P value	$\bar{x}^a$
Use paper scraps for notes and memos.						
Residents (n=246)	6.5	4.9	19.1	69.5	0.019	3.59
Key leaders (n=232)	3.0	5.2	11.2	80.6		3.74
Dispose of motor oil, grease, and chemicals at an approved waste collection site.						
Residents (n=246)	16.7	2.0	8.5	72.8	0.069	3.81
Key leaders (n=233)	9.0	3.0	7.3	80.7		3.82
Whenever a choice exists, purchase an alternative to a toxic household product.						
Residents (n=246)	4.1	9.3	22.4	64.2	0.284	3.53
Key leaders (n=234)	2.1	8.1	17.9	71.8		3.62
Repair major appliances (e.g.,washer, dryer) rather than replacing them with new appliances.						
Residents (n=247)	8.5	6.1	7.1	71.7	0.434	3.66
Key leaders (n=232)	5.6	8.2	11.6	74.6		3.68

[a]Mean is based on a 4-point response scale: 1=not at all willing, 2=somewhat willing, 3=moderately willing, 4=very willing.

Table 18. Reasons for product purchase and disposal intentions of residents and key leaders.

Behavior	Reason For Taking Action				
	To Protect the Environment	Other Reason	Both Reasons	X^2	P value
Use paper scraps for notes and memos.					
Residents (n=218)	31.2	16.1	52.8	13.01	0.001
Key leaders (n=210)	40.5	5.7	53.8		
Dispose of motor oil, grease, and chemicals at an approved waste collection site.					
Residents (n=195)	60.0	4.1	35.9	9.04	0.010
Key leaders (n=197)	74.1	2.0	23.9		
Whenever a choice exists, purchase an alternative to a toxic household product.					
Residents (n=228)	54.4	9.6	36.0	10.81	0.004
Key leaders (n=214)	62.1	2.3	35.5		
Repair major appliances (e.g.,washer, dryer) rather than replacing them with new appliances.					
Residents (n=216)	12.5	29.6	57.9	7.49	0.023
Key leaders (n=211)	12.8	18.5	68.7		

Table 19. Political action intentions of residents and key leaders.

Behavior	Willingness to Take Action in Next 12 Months					
	Not at All	Somewhat	Moderately	Very	P value	$\bar{x}$[a]
Sign a petition asking for increased environmental protection in and around the Lake Ontario environment.						
Residents (n=244)	10.2	18.0	18.9	52.9	0.032	3.19
Key leaders (n=230)	16.1	11.3	14.3	58.3		3.20
Vote for political candidates because of their proposed environmentally conscious policies.						
Residents (n=247)	15.4	21.1	30.0	33.6	0.004	2.92
Key leaders (n=232)	12.1	13.8	24.6	49.6		3.19
Urge my place of business to take steps to operate in a more environmentally-friendly way.						
Residents (n=243)	36.6	8.2	13.6	41.6	<0.001	3.32
Key leaders (n=233)	10.3	2.6	19.7	67.4		3.50
Write a letter to a government representative expressing my opinion about an environmental program or policy.						
Residents (n=248)	31.9	32.3	21.4	14.5	<0.001	2.23
Key leaders (n=232)	19.8	19.8	21.1	39.2		2.91
Help campaign for a political candidate because he/she supports protective environmental actions.						
Residents (n=242)	45.9	23.6	16.9	13.6	0.283	2.07
Key leaders (n=232)	43.1	22.0	14.7	20.3		2.18

[a]Mean is based on a 4-point response scale: 1=not at all willing, 2=somewhat willing, 3=moderately willing, 4=very willing.

Table 20. Reasons for political action intentions of residents and key leaders.

Behavior	Reason For Taking Action				
	To Protect the Environment	Other Reason	Both Reasons	X^2	P value
Sign a petition asking for increased environmental protection in and around the Lake Ontario environment.					
Residents (n=195)	68.2	5.6	26.2	5.38	0.067
Key leaders (n=177)	78.5	2.8	18.6		
Vote for political candidates because of their proposed environmentally conscious policies.					
Residents (n=193)	56.5	14.0	29.5	10.55	0.005
Key leaders (n=182)	68.7	4.9	26.4		
Urge my place of business to take steps to operate in a more environmentally-friendly way.					
Residents (n=142)	52.1	5.6	42.3	2.91	0.233
Key leaders (n=194)	60.3	3.1	36.6		
Write a letter to a government representative expressing my opinion about an environmental program or policy.					
Residents (n=155)	63.2	10.3	26.5	41.5	0.125
Key leaders (n=174)	71.8	5.2	23.0		
Help campaign for a political candidate because he/she supports protective environmental actions.					
Residents (n=119)	52.9	14.3	32.8	8.82	0.012
Key leaders (n=123)	69.9	5.7	24.4		

Table 21. Summary statistics for chosen scale score of 19 stewardship actions.

Concept Area	Respondent Group	Possible Range	Mid-Range Value	Actual Range	Mean	S.E.	Mode	Median	Skewness	Kurtosis	% Missing	P value
Behaviors	Residents	0-171	86	20-132	70.8	1.38	69.0	71.0	0.01	-0.003	12.9%	<0.001
	Key Leaders	0-171	86	25-166	78.9	1.60	76.0	76.0	0.35	0.49	8.5%	
Intentions	Residents	0-171	16-171	86	104.2	1.99	104.0	105.5	-0.17	-0.17	10.6%	<0.001
	Key Leaders	0-171	11-171	86	116.3	1.92	119.0	117.0	-0.46	0.81	7.6%	

scores for residents and key leaders, key leaders were more likely than residents to engage in stewardship behaviors and were more willing to take action in the future. Both residents' and key leaders' intentions were indicative of higher stewardship commitment than exhibited through their behaviors during the past 12 months (Figure 3).

Appendices M and N illustrate the differences in mean scores achieved for intentions and behaviors using each of the four scoring methods. Regardless of the scoring method, the mean score for intentions was higher than that for behaviors for both groups of respondents. This finding can be explained in a number of ways. First, intentions may not be manifested as behaviors if individuals perceive barriers exist that may prevent them from taking actions that are good for the environment. Thus, although their level of commitment to environmental stewardship may be high, respondents may not be able to act on that commitment. Second, respondents were asked to indicate their behaviors over the *past* 12 months and their intentions over the *next* 12 months. Respondents may be more willing to engage in some of the stewardship behaviors included in the survey because they now are more aware of the types of behaviors considered important to protecting the Lake Ontario environment. Hence, although they did not take action in the past or acted infrequently, they may be more willing to take action in the future. Finally, respondents' willingness to engage in the stewardship behaviors included in the questionnaire may indicate the presence of a social desirability response bias. In other words, respondents may have been motivated to present themselves in a way that society regards as positive, regardless of their true intentions.

In question 14, respondents were asked if they would be willing to make changes in their daily lives to help protect the Lake Ontario environment, even if such changes led to personal sacrifices (e.g., in comfort, spending power, personal safety). For all of the items

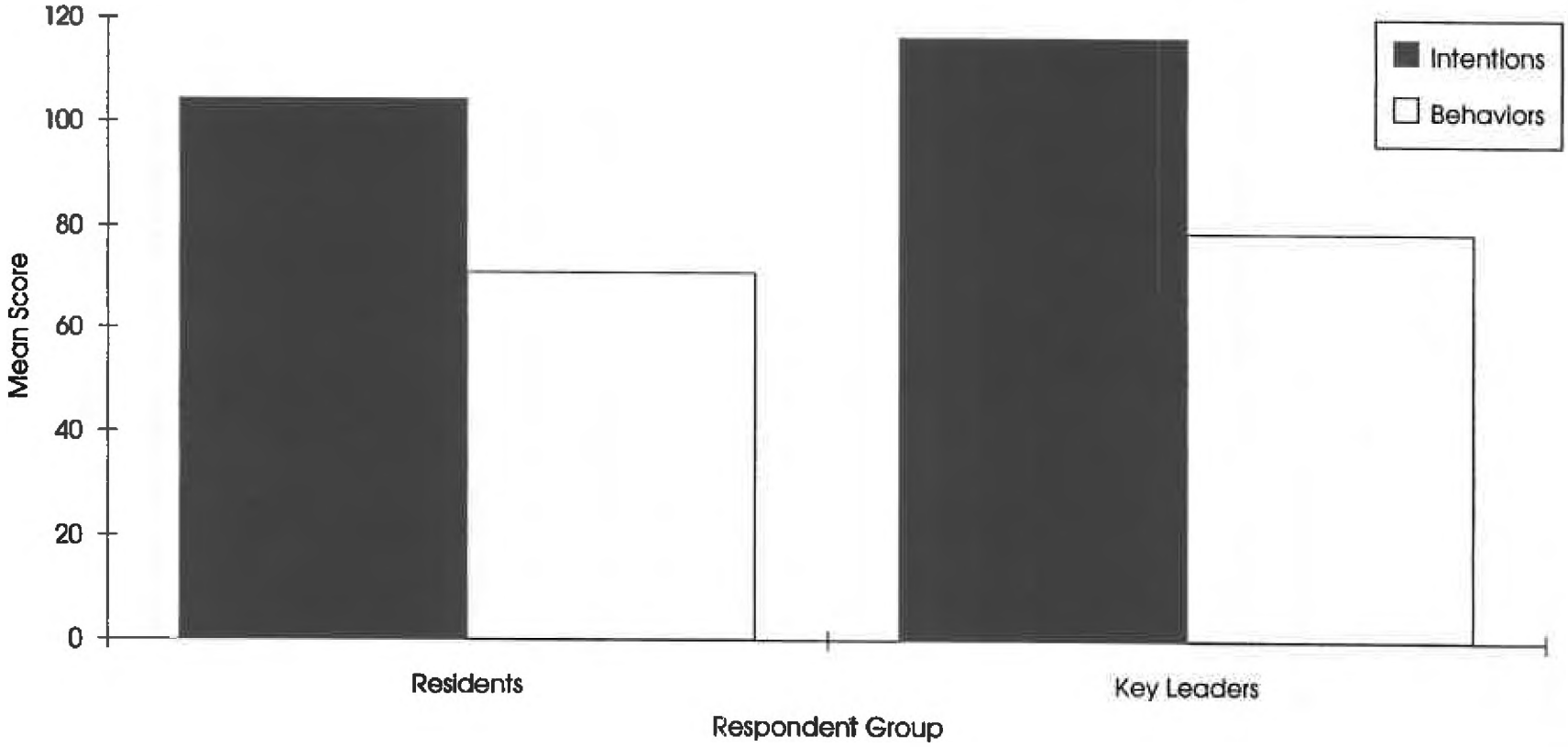

Figure 3. Comparison of residents' and key leaders' scores for intentions and behaviors.

except the one related to personal safety, the majority of responses were in the range from "neutral" to "strongly agree" (Table 22). Residents and key leaders differed in their willingness to make sacrifices in most areas. For some items, the difference expressed may not be of practical value. However, the data indicate a general trend among key leaders toward greater willingness to make personal sacrifices for the environment.

Finally, questionnaire item 15 used a willingness-to-pay approach to estimate intentions (Table 23). About 29% of residents were willing to pay nothing, 20% would pay less than $25, and about 9% would pay more than $99 in prices, taxes, and fees if the extra money were used to help protect the Lake Ontario environment. On average, key leaders expressed a higher willingness to pay higher prices, taxes, and fees if the extra money was used to help protect the Lake Ontario environment (mean willingness to pay among residents was $25-$49; mean willingness to pay for key leaders was $50-74). Only 16% of key leaders were willing to pay nothing, 40% would pay $1-$99, and about 20% would pay more than $99.

It is possible that differences in willingness to pay for environmental protection measures were associated with differences in education or income between residents and key leaders. The sample sizes were not large enough for adequate examination of the effects of education or income on willingness to pay.

Scoring Issues: The discussion in this subsection relates to the scale we developed to compare the results of questions 5-7 with those of question 13. The primary purposes of this score are to summarize stewardship behaviors and intentions and to illustrate the extent to which people's behaviors reflect their stewardship intentions. According to the summary statistics for the recommended scale score, the data are normally distributed. For the data to be considered normally distributed, the values for skewness and kurtosis should be in the

Table 22. Resident and key leader willingness to make personal sacrifices to help protect and conserve the Lake Ontario environment.

Potential Sacrifice	Agreement with Statement (%)							
	Strongly Disagree		Neutral		Strongly Agree	X^2	P value	$\bar{x}^a$
My personal level of comfort								
Residents (n=239)	2.9	13.0	49.8	27.6	6.7	27.57	<0.001	3.22
Key leaders (n=234)	2.1	12.8	29.5	38.5	17.1			3.56
The amount of money I have available								
Residents (n=240)	18.8	26.7	36.3	14.6	3.8	33.90	<0.001	2.58
Key leaders (n=234)	8.1	22.6	28.2	31.2	9.8			3.12
The range of choices I have in products I might want to purchase								
Residents (n=241)	2.1	7.9	33.2	40.7	16.2	28.57	<0.001	3.61
Key leaders (n=234)	2.6	7.3	14.1	46.6	29.5			3.93
My personal freedom								
Residents (n=241)	17.4	14.5	41.1	20.3	6.6	11.28	0.023	2.84
Key leaders (n=231)	15.6	19.0	28.1	28.6	8.7			2.96
My personal convenience								
Residents (n=241)	9.1	14.5	41.1	27.4	7.9	24.58	0.001	3.10
Key leaders (n=231)	2.2	14.7	29.0	40.3	13.9			3.49
The amount of time I have available for other activities								
Residents (n=239)	5.9	20.5	48.5	20.9	4.2	8.95	0.062	2.97
Key leaders (n=231)	7.8	21.6	35.9	27.7	6.9			3.04
My personal social status								
Residents (n=240)	9.6	8.8	52.9	18.8	10.0	16.85	0.002	3.11
Key leaders (n=228)	9.6	10.1	35.5	26.8	18.0			3.33
My personal safety								
Residents (n=242)	27.7	12.4	27.7	21.1	11.2	19.41	<0.001	2.76
Key leaders (n=226)	39.4	20.8	18.1	15.0	6.6			2.29

Table 22. Cont.

Potential Sacrifice	Agreement with Statement (%)					X^2	P value	$\bar{x}^a$
	Strongly Disagree		Neutral		Strongly Agree			
My range of choices of where to work								
Residents (n=229)	26.2	10.5	47.2	10.0	6.1	23.35	<0.001	2.59
Key leaders (n=231)	22.1	23.4	32.2	17.3	5.2			2.60
My range of choices of where to live								
Residents (n=234)	23.9	13.2	40.6	14.5	7.7	11.33	0.023	2.69
Key leaders (n=232)	24.1	22.8	29.7	17.7	5.6			2.58

[a]Mean based on a 5-point response scale: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree.

Table 23. Resident and key leader willingness to pay per month in additional consumer prices, taxes, and fees if the revenue generated were used by businesses and governments to conserve the Lake Ontario environment.

Extra Money Per Month	Residents (n=248)	Key Leaders (n=223)	X^2	P value
None	29.4	16.6	35.98	<0.001
$1 to $24	20.6	14.8		
$25 to $49	12.9	15.7		
$50 to $74	7.3	12.1		
$75 to $99	2.0	7.2		
$100 or more	8.9	21.1		
Don't know	19.0	12.6		

range $-1 \leq 0 \leq +1$ and the mean and median should be approximately equal. A negative value for skewness indicates that the curve is skewed left, and a negative value for kurtosis indicates that the shape of the curve is slightly flatter than a normal bell-shaped curve.

The mid-range value for the set of 19 behavior items is greater than the mean and the median for both groups of respondents, which indicates that the scale probably has a floor effect (i.e., the scale seems to reflect a population that is lower in stewardship behaviors than one might expect based on the possible mid-range value). The mid-range value for the set of 19 intention items is less than the mean and the median for both groups of respondents, which indicates that the scale probably has a ceiling effect (i.e., the scale seems to reflect a population that is higher in stewardship intentions than one might expect based on the possible mid-range value). The alternative scale scores also indicate the presence of a ceiling effect for the set of intentions items and either a slight ceiling or floor effect for the set of behavior items. To address this issue, future users should consider creating additional response categories at the extreme ends of the scale to better distinguish between respondents.

We did not develop a scoring system for survey questions 14 or 15 because they were not developed as scales; they were analyzed on an item-by-item basis.

Measurement Issues: Some item revisions are necessary to ensure a valid and reliable survey instrument that is capable of measuring changes in people's behaviors and intentions over a reasonable period (e.g., 10 or more years). For the set of 19 identical behavior and intention items, future users should consider the following modifications: (1) adding more response categories to each item; (2) having more than five commitment levels; and/or (3) changing the definitions associated with the five commitment levels and modifying the questionnaire items accordingly (e.g., having commitment level five for energy be

represented by a person retrofitting their house to install solar panels, a behavior considered quite difficult for the average individual). In terms of specific items, future users should consider replacing the commitment level five item for water use (i.e., collecting gray water to use in flushing toilets) with an activity that is more relevant to water concerns in the Basin. Future users also should consider substituting a different behavior for the commitment level one item for political involvement (i.e., signing an environmental petition) since petitions currently may not be a common form of political expression. Finally, an item should be added to the product purchase and disposal resource sector to represent commitment level five. The pilot survey contained only four items for this resource sector, with one item representing both commitment levels three and five depending on frequency differences. The calculation of the scale score was more difficult as a result.

In question 14, the high proportion of neutral responses to each item, especially among residents, suggests that the items may be too ambiguous to provide reliable data. However, if revised, items of this nature may become valuable indications of differences between key leaders and residents in acceptance of the need to make personal lifestyle sacrifices to safeguard the environment. If that is an important consideration to future researchers, some variation on those items should be considered.

An item related to willingness-to-pay for environmental protection should provide valuable information to policy makers and should be included in future instruments. However, resident questionnaire item 15 may be too general to provide data of much utility to decision-makers. To be useful, the response categories in questionnaire item 15 should be revised and the item should be more detailed and specific. Moreover, researchers should make sure that variables such as income and education level are controlled when willingness to pay data are interpreted.

Stewardship Incentives and Barriers

Findings and Implications: For most respondents, economic incentives would encourage actions to protect or conserve the environment. Key leaders were more likely than residents to report tax reductions and saving money by using resource-conserving devices as strong incentives to take action (Table 24).

Residents generally were more likely than key leaders to perceive knowledge, information, financial resources, and other factors as barriers to stewardship behavior (Table 25). It is possible that differences in perceived barriers to stewardship behavior were associated with differences in education or income between residents and key leaders. The sample sizes were not large enough for adequate examination of the effects of education or income on perceived barriers.

Scoring Issues: We focused on economic incentives to take stewardship actions. Confirmatory factor analysis suggested that the items we developed provide a scale with high internal consistency (alpha = 0.87) (Appendix O) and produce two factors that explain 59% of variance among respondents (Table 26). All items in the main factor were related to positive economic incentives. Items in the second factor were more difficult to characterize. We labelled this factor as miscellaneous incentives.

We developed items that we believed assessed stewardship barriers that were related to five concept areas: cultural factors, psychological factors, economic resources, demographics, and knowledge factors. Reliability analysis produced an alpha of 0.81, indicating relatively high internal consistency among items (Table 27). Factor analysis produced three factors with an eigenvalue more than one, that explained 53% of variance among respondents (Table 28). The first factor grouped items related to information, knowledge, skills, personal influence, and personal finances. The second factor grouped

Table 24. Potential incentives to take stewardship behaviors as perceived by residents and key leaders in Ontario, Canada.

Potential Incentive	Degree to Which Incentive Would Encourage Stewardship						
	Would Not Encourage At All		Would Encourage Somewhat		Would Encourage Strongly	P value	$\bar{x}^a$
Receiving free assistance from a trained professional in installing resource-conserving devices in my home.							
Residents (n=240)	13.8	10.0	40.8	14.6	20.8	0.091	3.19
Key leaders (n=236)	12.3	7.6	32.2	21.2	26.7		3.42
Receiving a reduction in my sales, property, or income taxes.							
Residents (n=238)	5.0	5.0	23.9	18.5	47.5	0.010	3.98
Key leaders (n=235)	3.0	2.1	14.5	20.9	59.6		4.32
Seeing that I would save money in the long-term by using resource-conserving devices (e.g., low-flow shower heads, energy efficient light bulbs).							
Residents (n=241)	3.3	4.6	36.1	19.5	36.5	0.031	3.81
Key leaders (n=236)	2.5	2.1	28.0	30.5	36.9		3.97
Having utility bills lower than what I pay now.							
Residents (n=243)	1.2	2.9	22.2	21.4	52.3	0.248	4.21
Key leaders (n=236)	2.1	2.1	17.4	29.2	49.2		4.21
Receiving rebates for purchasing products that conserve resources (e.g., water, energy).							
Residents (n=242)	3.3	9.1	22.3	26.4	38.8	0.139	3.88
Key leaders (n=236)	3.8	3.4	25.4	28.4	39.0		3.95

Table 24. Cont.

Potential Incentive	Degree to Which Incentive Would Encourage Stewardship						
	Would Not Encourage At All		Would Encourage Somewhat		Would Encourage Strongly	P value	$\bar{x}$[a]
Receiving low-cost loans to help buy energy-efficient homes, cars, and large household appliances.							
Residents (n=241)	18.7	10.0	20.3	19.1	32.0	0.422	3.36
Key leaders (n=236)	14.8	13.6	16.5	19.1	36.0		3.48
Receiving free or subsidized environmentally-friendly goods (e.g., composters, trees).							
Residents (n=239)	7.9	7.1	22.2	23.4	39.3	0.2386	3.79
Key leaders (n=236)	4.7	4.7	18.6	27.5	44.5		4.02
Receiving lower prices on resource-conserving devices (e.g., low-flow shower heads, energy efficient light bulbs) compared to other devices.							
Residents (n=244)	4.5	4.5	25.8	21.7	43.4	0.093	3.95
Key leaders (n=236)	1.7	3.0	20.3	28.8	46.2		4.15
Receiving a land tax rebate for committing my land to conservation uses.							
Residents (n=237)	28.3	12.2	27.8	8.4	23.2	0.001	2.86
Key leaders (n=224)	17.9	8.5	25.9	18.8	29.0		3.32
Having to pay fines for violating regulations related to resource conservation (e.g., fines for throwing away recyclable cans).							
Residents (n=244)	16.8	9.4	27.5	13.5	32.8	0.586	3.36
Key leaders (n=229)	16.6	9.6	21.4	16.6	35.8		3.45

[a]Mean based on a 5-point response scale: 1=would not encourage at all, 3=would encourage somewhat, 5=would encourage strongly.

Table 25. Potential barriers to taking stewardship behaviors as perceived by residents and key leaders in Ontario, Canada.

Potential Barriers	Level of Personal Importance						
	Not at all Import.	Some-what Import.	Moder-ately Import.	Very Import.	Ex-tremely Import.	P value	$\bar{x}^a$
Lack of time.							
Residents (n=241)	15.8	25.7	33.2	19.5	5.8	0.003	2.74
Key leaders (n=236)	11.4	19.5	27.1	29.7	12.3		3.12
Personal inconvenience caused by products or actions that are good for the environment.							
Residents (n=235)	21.7	29.4	38.3	9.4	1.3	0.604	2.39
Key leaders (n=236)	27.5	28.8	32.6	9.7	1.3		2.28
Lack of knowledge about what actions are good for the environment.							
Residents (n=242)	12.8	16.9	36.4	29.8	4.1	<0.001	2.96
Key leaders (n=235)	38.3	23.0	22.6	10.2	6.0		2.22
Loss of my personal freedom to choose how I live my own life.							
Residents (n=243)	32.9	25.1	21.4	14.8	5.8	<0.001	2.35
Key leaders (n=235)	53.6	26.0	12.3	5.1	3.0		1.78
Lack of financial resources.							
Residents (n=242)	15.3	17.8	21.5	28.9	16.5	<0.001	3.14
Key leaders (n=235)	34.0	21.3	22.1	15.3	7.2		2.40
My age.							
Residents (n=242)	48.3	13.6	16.5	11.6	9.9	<0.001	2.21
Key leaders (n=234)	80.8	8.5	7.7	2.1	0.9		1.34
Lack of skills needed to take actions that are good for the environment.							
Residents (n=240)	25.0	24.6	26.3	18.3	5.8	<0.001	2.55
Key leaders (n=235)	49.8	24.7	17.9	6.4	1.3		1.85

Table 25. Cont.

Potential Barriers	Level of Personal Importance						
	Not at all Import.	Some-what Import.	Moder-ately Import.	Very Import.	Ex-tremely Import.	P value	$\bar{x}^a$
Feeling that I have a lack of influence over decisions made by environmental agencies and organizations in the Lake Ontario Basin.							
Residents (n=242)	12.8	16.5	28.5	27.7	14.5	0.002	3.15
Key leaders (n=236)	34.3	25.4	19.5	9.3	11.4		2.38
Lack of information about products that are good for the environment.							
Residents (n=243)	11.9	16.0	28.0	29.2	14.8	<0.001	3.19
Key leaders (n=235)	25.5	24.3	26.4	17.0	6.8		2.55
Feeling that I should devote time and/or money to other community and social issues.							
Residents (n=241)	29.9	22.0	31.1	14.9	2.1	0.617	2.37
Key leaders (n=236)	30.1	19.9	28.0	18.2	3.8		2.46
Lack of approval or encouragement from my family and friends.							
Residents (n=239)	59.8	18.4	12.6	8.4	0.8	0.004	1.72
Key leaders (n=235)	74.0	15.7	7.2	2.6	0.4		1.40
I don't have much interest in environmental issues.							
Residents (n=240)	36.3	17.9	27.1	14.2	4.6	<0.001	2.33
Key leaders (n=226)	82.7	5.8	7.1	4.0	0.4		1.34

[a]Mean based on a 5-point response scale: 1=not at all important, 2=somewhat important, 3=moderately important, 4=very important, 5=extremely important.

Table 26. Factor analysis of 10-item index of incentives to protect and conserve the environment around Lake Ontario.

Factor 1 (Positive Economic Incentives)	Factor loading
Receiving free assistance from a trained professional in installing resource-conserving devices in my home.	0.5793
Receiving a reduction in my sales, property, or income taxes.	0.6647
Seeing that I would save money in the long-term by using resource-conserving devices (e.g., low-flow shower heads, energy efficient light bulbs).	0.8282
Having utility bills lower than what I pay now.	0.8461
Receiving rebates for purchasing products that conserve resources (e.g., water, energy).	0.7264
Receiving lower prices on resource-conserving devices (e.g., low-flow shower heads, energy efficient light bulbs) compared to other devices.	0.7343
Factor 2 (Miscellaneous Incentives)	
Receiving low-cost loans to help buy energy-efficient homes, cars, and large household appliances.	0.6754
Receiving free or subsidized environmentally-friendly goods (e.g., composters, trees).	0.5982
Receiving a land tax rebate for committing my land to conservation uses.	0.7282
Having to pay fines for violating regulations related to resource conservation (e.g., fines for throwing away recyclable cans).	0.6873

Table 27. Reliability analysis of barriers index.

n	# of items	Alpha	Item to remove to improve alpha
442	12	0.805	12a
442	11	0.809	12j
442	10	0.810	none

items related to time and convenience. The third factor grouped the remaining items: age, approval, disinterest in the environment, and loss of personal freedom.

Measurement Issues: Our incentives items provide a reliable indication of economic incentives to take stewardship actions. We did not have enough items on fines and penalties as disincentives to adequately assess this concept area: more items should be added to future instruments if this area is of interest.

We also recommend that future instruments devote more attention to the topic of stewardship barriers. The items we developed did not group entirely as expected. They seem to represent more an aggregation of items than a true conceptually-oriented scale. Of specific concern was the item we developed on loss of personal freedom as a stewardship barrier. We hypothesized that concerns about loss of personal freedom to choose how one lives their life would be an important barrier to stewardship behavior. Our findings ran contrary to that hypothesis and raised concern about the validity of that item. We recommend that the item we used be dropped from future instruments. If the topic of personal freedom remains of interest to future researchers, a new item that includes a clearer concept definition should be developed.

Table 28. Factor analysis of 12-item index of barriers to protecting and conserving the environment around Lake Ontario.

Factor 1 (Knowledge, Skills, and Finances)	Factor loading
Lack of knowledge about what actions are good for the environment.	0.7588
Lack of financial resources.	0.4806
Lack of skills needed to take actions that are good for the environment.	0.6685
Feeling that I have a lack of influence over decisions made by environmental agencies and organizations in the Lake Ontario Basin.	0.6146
Lack of information about products that are good for the environment.	0.8112
Factor 2 (Time and Convenience)	
Lack of time.	0.5793
Personal inconvenience caused by products or actions that are good for the environment.	0.5139
Feeling that I should devote time and/or money to other community and social issues.	0.6404
Factor 3 (Freedom, Approval, and Interest)	
Loss of my personal freedom to choose how I live my own life.	0.5686
My age.	0.6978
Lack of approval or encouragement from my family and friends.	0.6755
I don't have much interest in environmental issues.	0.6791

Key Leader Perceptions of Resident Behavior

Findings and Implications: We used four items to assess the accuracy of key leader perceptions of residents' behaviors. Key leader perceptions significantly under-estimated resident energy-related behavior on three of the four items (Table 29). However, key leaders held relatively accurate perceptions of why residents took energy conservation measures (Table 30).

- Scoring Issues: There are no salient scoring issues to consider with regard to key leader perceptions of resident behaviors.

- Measurement Issues: For informed public policy debates, it is critical that key leaders understand resident behaviors and reasoning. Therefore, items similar to these should be included in the future. However, future users should consider the relevance of energy conservation items versus those related to other resource sectors.

Key Leader Perceptions of Behavior Incentives and Barriers for Residents

Findings and Implications: Key leaders accurately perceived that residents would be encouraged to practice stewardship behaviors by: saving money through use of resource-conserving devices, receiving lower prices on resource-conserving devices, having lower utility bills, and receiving product rebates. Key leaders significantly overestimated the attractiveness of options including: land tax rebates, receiving free assistance from trained professionals, fines for noncompliance with conservation programs, and reduction in sales, property, or income taxes (Table 31).

Key leaders overestimated the importance of many potential barriers to stewardship behavior by residents. Key leaders over-rated the importance of barriers such as residents' perceived: ability to influence environmental decision-makers, skills related to action-taking, social support, time, information, and interest in the environment (Table 32).

Table 29. A comparison of Basin residents' stewardship-related behaviors and key leader perceptions of the frequency with which Basin residents exhibited those behaviors.

Behavior	Item Mean		t-value	P value
	Residents[a]	Key Leaders' Perceptions[b]		
Used low wattage energy efficient light bulbs in their homes	2.60	2.22	4.76	<0.001
Turned off the lights when no one was in a room	3.78	2.52	23.72	<0.001
Used different types of transportation rather than personally driving a car (e.g., bike, walk, car-pool, bus).	2.21	2.09	1.69	0.093
During the winter, kept their thermostats at 15°C (60°F) or lower at night.	2.56	2.09	4.99	<0.001

[a]Mean calculated from a 4-point scale on frequency of behavior in the past 12 months: 1=never, 2=some or a little of the time, 3=often or a moderate amount of time, 4=most or all of the time.
[b]Mean calculated from a 4-point scale based on *key leaders' perceptions* of frequency with which residents exhibited a particular behavior in the past 12 months: 1=never, 2=some or a little of the time, 3=often or a moderate amount of time, 4=most or all of the time.

Table 30. A comparison of reasons for Basin residents' energy-use behaviors and key leader perceptions of the reasons why Basin residents exhibited those behaviors.

Behavior	Reason For Taking Action				
	To Protect the Environment	Other Reason	Both Reasons	X^2	P value
Turned off the lights when no one is in a room.					
Residents (n=239)	12.6	32.1	55.2	4.93	0.084
Key leaders' perceptions (n=213)	6.6	37.1	56.3		
Used low wattage energy efficient light bulbs in their home.					
Residents (n=182)	22.5	26.9	50.5	4.46	0.107
Key leaders' perceptions (n=210)	14.3	29.5	56.2		
During the winter, kept their thermostats at 15°C (60°F) or lower at night.					
Residents (n=149)	12.8	36.9	50.3	3.83	0.146
Key leaders' perceptions (n=183)	6.6	37.7	55.7		
Mainly used different types of transportation rather than personally driving a car (e.g., bike, walk, car pool, bus).					
Residents (n=152)	13.2	47.4	39.5	7.95	0.018
Key leaders' perceptions (n=194)	16.5	32.5	51.0		

Table 31. A comparison of Basin residents' opinions on potential incentives to take stewardship-related behaviors and key leader perceptions of the degree to which Basin residents considered those items as stewardship incentives.

Behavior	Item Mean: Residents[a]	Item Mean: Key Leaders' Perceptions[b]	t value	P value
Receiving low-cost loans to help them buy energy-efficient homes, cars, and large household appliances.	3.36	3.58	-1.97	0.051
Seeing that they would save money in the long-term by using resource-conserving devices (e.g., low-flow shower heads, energy efficient light bulbs).	3.81	3.73	0.88	0.380
Receiving a land tax rebate for committing their land to conservation uses.	2.86	3.43	-4.62	<0.001
Receiving free or subsidized environmentally-friendly goods (e.g., composters, trees).	3.79	3.95	-1.60	0.111
Receiving free assistance from a trained professional in installing resource-conserving devices in their homes.	3.18	3.58	-3.74	<0.001
Having utility bills lower than what they pay now.	4.20	4.26	-0.71	0.083
Having to pay fines for violating regulations related to resource conservation (e.g., fines for throwing away recyclable cans).	3.36	3.62	-2.09	0.037
Receiving rebates for purchasing products that conserve resources (e.g., water, energy).	3.88	3.80	0.82	0.410
Receiving a reduction in their sales, property, or income taxes.	3.98	4.28	-3.17	0.002
Receiving lower prices on resource-conserving devices (e.g., low-flow shower heads, energy efficient light bulbs) compared to other devices.	3.95	3.98	-0.34	0.735

[a]Mean calculated from a 5-point scale (1=would not encourage at all, 5=would encourage strongly) on the degree to which factor would encourage actions to protect and conserve the environment around Lake Ontario.
[b]Mean calculated from a 5-point scale (1=would not encourage at all, 5=would encourage strongly) on the degree to which key leaders believed factor would encourage residents to protect and conserve the environment around Lake Ontario.

Table 32. A comparison of Basin residents' opinions on potential barriers preventing stewardship-related behaviors and key leader perceptions of the importance of potential barriers to Basin residents.

Behavior	Item Mean		t value	P value
	Residents[a]	Key Leaders' Perceptions[b]		
Feeling they lack influence over decisions made by environmental agencies and organizations in the Lake Ontario Basin.	3.14	3.49	-3.26	0.001
Lack of skills needed to take actions that are good for the environment.	2.55	3.21	-6.47	<0.001
They don't have much interest in environmental issues.	2.32	3.06	-6.93	<0.001
Their age.	2.21	2.13	0.67	0.502
Feeling like they should devote time and/or money to other community and social issues.	2.37	2.79	-4.39	<0.001
Lack of approval or encouragement from their family and friends.	1.72	2.31	-6.18	<0.001
Lack of knowledge about what actions are good for the environment.	2.95	3.36	-4.31	<0.001
Personal inconvenience caused by products or actions that are good for the environment.	2.39	3.44	-11.66	<0.001
Lack of financial resources.	3.13	3.30	-1.51	0.132
Lack of time.	2.73	3.35	-6.20	<0.001
Lack of information about products that are good for the environment.	3.18	3.44	-2.48	0.014
Loss of their personal freedom to choose how they live their own lives.	2.35	2.95	-5.31	<0.001

[a]Mean calculated from a 5-point scale (1=not important, 5=extremely important) on the degree to which factor would prevent respondent from protecting and conserving the environment around Lake Ontario.
[b]Mean calculated from a 5-point scale (1=not important, 5=extremely important) on the degree to which *key leaders believed* factor would prevent respondent from protecting and conserving the environment around Lake Ontario.

Scoring Issues: There are no salient scoring issues to consider with regard to key leader perceptions of behavior incentives and barriers for residents.

Measurement Issues: As noted earlier, key leaders must have accurate understanding of citizen perception regarding the attractiveness and importance of potential stewardship incentives and barriers if effective public policy is to be created. These items should be retained in the future.

SUMMARY FINDINGS AND RECOMMENDATIONS

Implications Regarding Stewardship in Ontario

As noted in the Methods section, this study was designed as a pilot test of the stewardship indicator measures. Sampling methods were not designed to produce a set of respondents necessarily representative of the entire Canadian Lake Ontario Basin population, although we did make an effort to distribute the sample geographically and between rural and urban areas. The findings from this study therefore should be interpreted with some caution regarding their applicability to the Canadian Lake Ontario Basin population as a whole. Similarly, key leaders were analyzed as a group rather than as particular sectors of leaders. We expect differences may exist between types of key leaders, but we were not able to detect these with the sample size we used.

The majority of residents and key leaders are greatly concerned about the quality of the environment in Canada and in and around Lake Ontario. They feel some responsibility toward stewardship, and express a variety of motivations for this responsibility. Reasons for engaging in stewardship actions include desires to protect the environment, and accomplishing outcomes other than environmental protection (such as experiencing cost-savings). Reasons other than environmental protection were particularly important for residents, especially for actions related to energy and water use. Key leaders, as a group,

tended to be more concerned about environmental quality than residents, and hold reasons for engaging in stewardship that are more directly related to a desire to protect the environment. Our sample sizes did not allow examining differences between types of key leaders. These strong desires to foster environmental protection, among both residents and key leaders, bode well for attaining future political support for environmental protection initiatives.

Nearly all respondents had engaged in stewardship-related behaviors in the resource sectors studied. The greatest degree of stewardship actions were reported for the energy use and product purchase/disposal sectors, and fewest related to political involvement or water use. This may be an artifact of the measurement method used, or may be indicative of less activity in those areas. Policy-makers should examine the types of activities specifically included in the questionnaire, and determine how relevant and important these are for the environmental protection needs of the Lake Ontario ecosystem. The summary stewardship behavior score for residents was 70.8 (mean) or 71.0 (median), compared to a possible mid-range value of 86. The key leader score was 78.9 (mean) or 76.0 (median). Policy-makers should examine these scores and determine an appropriate target value. After the target value is established, plans can be developed to help move the population toward the desired level of stewardship behavior, focusing in part on reducing barriers and increasing incentives as explored in other parts of this survey.

Willingness to engage in stewardship behaviors was consistently higher in all resource sectors than actual stewardship behaviors reported, indicating greater commitment to stewardship than exhibited through behaviors. Key leaders were more willing than residents to engage in stewardship behaviors. The summary stewardship intentions score for residents was 104.2 (mean) or 105.5 (median), compared to a possible mid-range value of 86. The key

leader score was 116.3 (mean) or 117.0 (median). These values are higher than the summary scores for behaviors, measured on identical scales. Policy-makers should therefore be concerned with increasing potential incentives to encourage greater consistency between stewardship intentions and behaviors, while at the same time reducing the influence of barriers perceived to prevent adoption of stewardship behaviors. Policy-makers also should examine the intentions scores and determine an appropriate target value and mechanism to attain or maintain that value.

Based on our results, economic incentives appear to have potential for successfully encouraging actions to protect or conserve the environment. Penalties (i.e., disincentives) also may facilitate adoption of stewardship behaviors, but the instrument we developed does not allow us to adequately address this question.

Residents perceived a variety of barriers to stewardship behavior, including a variety of factors related to knowledge, information, and financial resources. Policy-makers should consider how to remove such barriers to result in greater consistency between stewardship intentions and behaviors among Lake Ontario Basin residents.

Key leaders underestimated residents' adoption of energy conservation behaviors, and overestimated the attractiveness of some stewardship incentives and the importance of many potential stewardship barriers to residents. For informed public policy debates to occur, key leaders actively engaged in such debates must have a realistic understanding of citizen behaviors and attitudes toward a variety of potential incentives and perceived barriers. Without such understanding, public policy is likely to be ineffective and not directed toward meaningful outcomes.

Refining Stewardship Measures

The effort reported here represents the first stage in developing an ongoing effort to monitor environmental stewardship in the Lake Ontario Basin. This study was designed as a pilot test to aid in developing a measurement process for stewardship indicators Basin-wide, and over the long-term. Most measures included in the pilot questionnaire produced reliable results. Several modifications are suggested for future implementation of a stewardship indicator monitoring effort:

1. Retain measures of respondent background characteristics (resident questionnaire items 16-25; key leader questionnaire items 21-32).

2. Retain most or all measures of concerns and beliefs about the environment (resident questionnaire items 1- 3). Consider additional response categories to provide greater differentiation between levels of concern.

3. Retain all measures on the stewardship beliefs scale (resident questionnaire items 4). Consider additional items to provide a richer definition of stewardship and greater differentiation between respondents.

4. Reduce the stewardship motivation scale (resident questionnaire items 10-11) to nine-12 items: three-four indicators of internal motivation, three-four indicators of external motivation, and three-four indicators of amotivation.

5. Further develop the stewardship behaviors scale to improve measurement of changes in people's behaviors and intentions over reasonable time periods (resident questionnaire items 5-7, and 13). Modifications to consider include adding more response categories to each item, creating more than five commitment levels, and/ or changing the definitions associated with the five commitment levels. Behavior items also should be examined to ensure they reflect behaviors that are particularly relevant to stewardship needs in the Lake Ontario Basin. Specific suggestions are included in the text of the report.

6. Revise items related to willingness to make personal lifestyle choices because they seem too ambiguous to provide reliable data (resident questionnaire items 14).

7. Include an item related to willingness-to-pay for environmental protection, as this will provide valuable information to policy makers. However, to increase utility of results, make the item as specific as possible. The general item in the pilot instrument (resident questionnaire item 15) should be revised. Moreover, make sure that variables such as income and education level are controlled when willingness-to-pay data are interpreted.

8. Retain stewardship incentives items (resident questionnaire items 8-9). Consider adding items measuring fines and penalties.

9. Retain stewardship barriers items (resident questionnaire items 12), except the item measuring loss of personal freedom (resident questionnaire items 12d), but consider further development and addition of items representing major conceptual areas.

10. Retain measures of key leader perceptions about residents' behaviors (key leader questionnaire items 16-17), but reassess whether energy conservation is the most important sector to be measuring for these purposes.

11. Retain measures of key leader perceptions about residents' attraction to stewardship incentives and beliefs about the importance of potential stewardship barriers (key leader questionnaire items 18-19).

A System for Long-term Monitoring of Environmental Stewardship

The next step in the development of a long-term system for monitoring environmental stewardship in the Lake Ontario Basin should include testing the pilot instrument (or a variation incorporating the recommendations above) in the U.S. portion of the Lake Ontario Basin. A pilot test in the New York portion of the Basin is scheduled for Fall 1995, or soon thereafter, pending review of the draft survey instruments by the Office of Management and Budget, as required by statute.

In addition, it may be useful to develop other modifications of the basic measurement instrument for implementation with certain sectors of citizens or key leaders who are of special interest or importance, especially from a public policy perspective. For example, K-12 educators were included among the key leaders in this study. Educators have unique opportunities to encourage environmental literacy and environmental stewardship among students. Thus, it may be important to understand the stewardship behaviors, motivations, and intentions among educators as citizens, but also as key influences on the next generation of citizens and leaders.

We suggest it will be desirable to retain a core set of measurement items from the pilot survey in every effort to quantify stewardship indicators (for purposes of comparison with

citizens and other key leaders throughout the Basin). We also suggest, however, that it will be useful to develop an additional set of measurement items specific to the key leader or citizen sector of special interest. In the case of educators, for example, a measurement effort would target the incentives, barriers, and behaviors found within the grade school setting, from the perspective of educators. A study of environmental stewardship among educators in the New York portion of the Lake Ontario Basin was implemented in Spring 1995, with Dixon and Knuth as the lead researchers (Dixon, in preparation). Future development of the stewardship indicator monitoring system should consider whether other types of citizen or resource sectors would be particularly important to analyze in-depth.

If stewardship indicators are to be used within a policy development framework, it is essential that policy-makers and citizens engage in a dialogue to establish desirable target values for each of the potential stewardship indicators. For example, the behaviors and intentions scales each have a possible range of 0-171, mid-range 86. These scales can be reduced mathematically to more intuitive ranges (e.g., one to ten) for use as overall indicators. In any case, however, potential users of these stewardship indicator scores must determine what scores will be judged desirable target endpoints. Only with such target endpoints identified will citizens and policy-makers be able to judge whether the Lake Ontario Basin population is improving or declining regarding environmental stewardship.

Instituting a long-term environmental stewardship monitoring effort in the Lake Ontario Basin, or in the entire Great Lakes Basin, would require careful attention to the sampling procedures used to ensure a representative sample of the general public that could be replicated at five to 10 year intervals. Decision-makers who would use the data should consider the relative benefits of drawing a new sample each time a measurement effort is undertaken versus following a consistent panel of citizens over time. Both approaches may

be desirable to ensure measures reflective of the then-current status of environmental stewardship within the Lake Ontario Basin (from a new sample), as well as to understand how motivations, intentions, behaviors, and perceptions change within individuals over time (from a citizen panel). Citizen panels, however, are costly in terms of the effort required to keep track of individual citizen addresses and status between measurement cycles.

A long-term monitoring effort also should include sample sizes for key leaders that are large enough to produce valid conclusions about any individual key leader sector. For policy and information-development purposes, it will be important to understand environmental stewardship measures among identifiable sectors, such as appointed and elected political officials, leaders in business and industry, educators, and leaders in citizen advocacy organizations.

Ideally, future monitoring efforts will occur simultaneously in the Canadian and U.S. portions of the Lake Ontario (or Great Lakes) Basin, to diminish data interpretation problems that may be complicated by the effects of time differentials. Differing federal statutory measurement requirements and procedures will have to be addressed to achieve this consistency.

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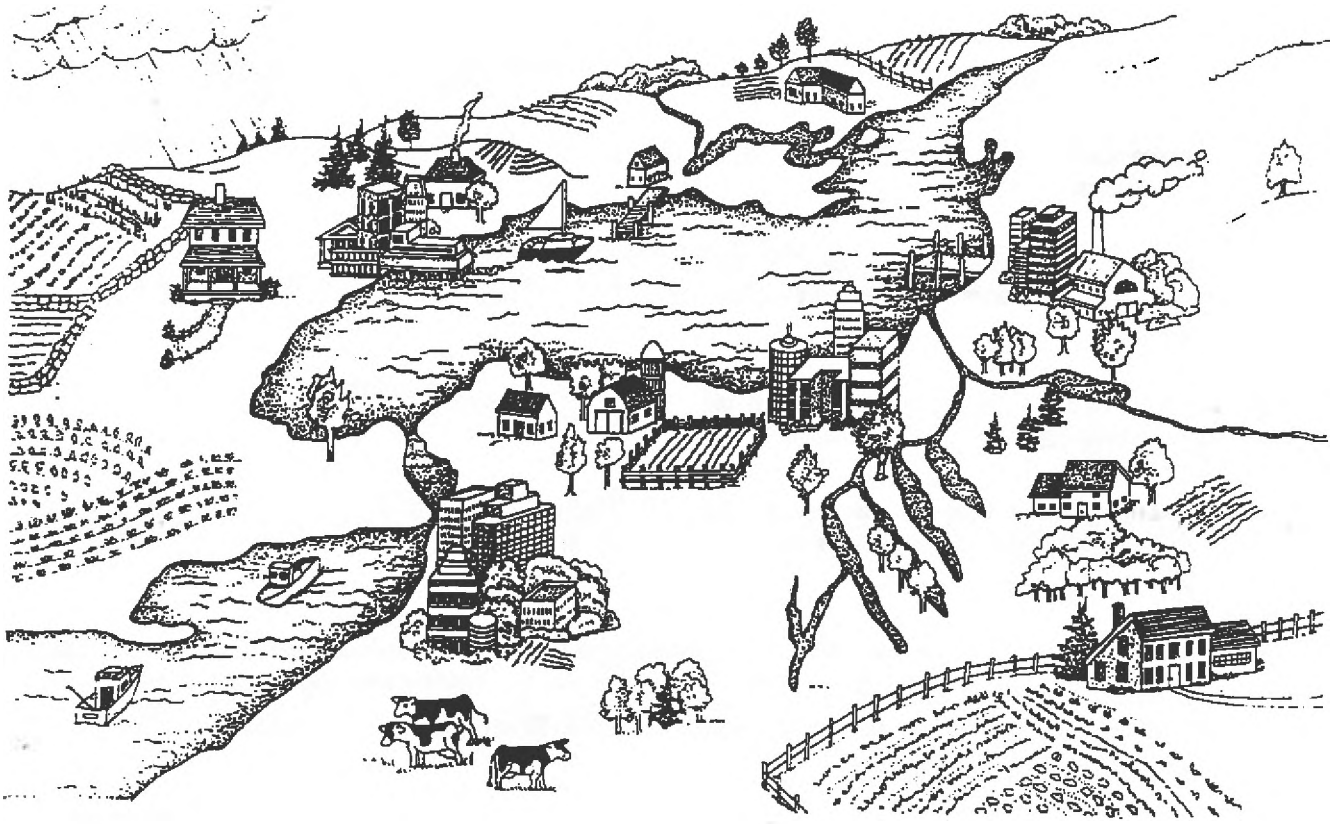
Appendix A: Resident Survey Instrument

OPINIONS OF ONTARIO RESIDENTS RELATED TO ENVIRONMENTAL QUALITY IN AND AROUND LAKE ONTARIO



Human Dimensions Research Unit
Department of Natural Resources
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Fernow Hall, Cornell University, Ithaca, N.Y. 14853

ABOUT THIS QUESTIONNAIRE

We seek your views as part of a binational effort to learn more about what people living near Lake Ontario think, feel, and do related to the environment of the Lake Ontario Basin. The purpose of the survey is to help government officials in Canada and the United States understand and consider people's beliefs, values, and behaviours as environmental policies for the Lake Ontario Basin are developed. This survey is sponsored by Health Canada and the United States Environmental Protection Agency (USEPA).

DIRECTIONS FOR COMPLETING THE QUESTIONNAIRE

- The questionnaire should be answered by the person to whom the envelope was addressed.
- Please answer each item on the questionnaire in the way that best reflects your own personal feelings, beliefs, and activities. There are no "right" or "wrong" answers.
- Please do your best to complete all items in the questionnaire. Most questions can be answered quickly and easily.
- Whenever you see an item that refers to the Lake Ontario environment, it means Lake Ontario and those portions of Ontario surrounding rivers that flow into the Lake.
- We want to hear from EVERYONE who receives this questionnaire, not just those people who are most aware of or interested in environmental issues. Your response is important to us; please complete and return your questionnaire at your earliest convenience.
- Please return the questionnaire using the addressed, pre-paid return envelope provided.

THANK YOU FOR YOUR ASSISTANCE!

SECTION ONE: YOUR OPINIONS ABOUT THE ENVIRONMENT

1. In general, how concerned are you about the following topics?

	Not At All Concerned	Somewhat Concerned	Greatly Concerned	Don't Know
a. The quality of the environment in Canada	1	2	3	☐
b. The quality of the environment in and around Lake Ontario	1	2	3	☐

2. Please circle the number that BEST represents how you would describe the quality of the natural environment in the following areas.

	Very Poor	Poor	Neither Poor Nor Good	Good	Very Good	Don't Know
a. In and around Lake Ontario	1	2	3	4	5	☐
b. In Canada as a whole	1	2	3	4	5	☐
c. The world as a whole	1	2	3	4	5	☐

3. How would you describe the quality of the environment in and around Lake Ontario today as compared to 5 years ago? *(Please check one.)*

- ☐ Very much worse
- ☐ Somewhat worse
- ☐ About the same
- ☐ Somewhat better
- ☐ Very much better
- ☐ Don't know

4. Please indicate how important each of the following is to you <u>personally</u>.

	Not At All Important	Moderately Important	Very Important	Extremely Important	Don't Know
a. Taking responsibility for how my actions may affect the environment	1	2	3	4	☐
b. Acting as a caretaker of the environment for future generations	1	2	3	4	☐

4. Continued.

	Not At All Important	Moderately Important	Very Important	Extremely Important	Don't Know
c. Limiting myself so that I use natural resources in a wise and efficient manner	1	2	3	4	☐
d. Showing a sense of respect for the earth	1	2	3	4	☐

SECTION TWO: YOUR ACTIONS AND BEHAVIOURS

Your responses to questions in this section will help us learn how often people engage in certain activities and their reasons for doing these activities.

5. Please circle the number that indicates how often in the past 12 months you did each of the following activities. *(If it was impossible for you to take a given action, circle "doesn't apply.")*

Then, for each action you took at least once, check one box to indicate whether you took that action to protect the environment, for some other reason (like saving money), or for both environmental and other reasons.

	How often did you take this action?					Why did you act?		
	Never	Some or a little of the time	Often or a moderate amount of time	Most or all of the time	Doesn't apply	To protect the environment	Other reasons	Both
I turned off the lights when no one was in a room	1	2	3	4	9	☐	☐	☐
When a choice existed, I purchased an alternative to a toxic household product	1	2	3	4	9	☐	☐	☐
I repaired faucets that leaked or dripped within a day or two of when I noticed the leak	1	2	3	4	9	☐	☐	☐
I disposed of motor oil, grease, and chemicals at an approved waste collection site	1	2	3	4	9	☐	☐	☐

5. Continued.

	How often did you take this action?					Why did you act?		
	Never	Some or a little of the time	Often or a moderate amount of time	Most or all of the time	Doesn't apply	To protect the environment	Other reasons	Both
I collected shower and dishwater to use in flushing toilets instead of using fresh water	1	2	3	4	9	☐	☐	☐
I used paper scraps for notes and memos	1	2	3	4	9	☐	☐	☐
While brushing my teeth, I turned off the water instead of letting it run	1	2	3	4	9	☐	☐	☐
I used different types of transportation rather than personally driving a car (e.g., bike, walk, car-pool, bus)	1	2	3	4	9	☐	☐	☐
I used low wattage energy efficient lightbulbs in my home	1	2	3	4	9	☐	☐	☐
During the winter, I kept my thermostat at 15°C (60°F) or lower at night	1	2	3	4	9	☐	☐	☐

6. During the past 12 months, have you: *(Please circle one choice per item.)*

	No	Yes, once	Yes, twice	Yes, more than two times	Not applicable
a. Voted for political candidates because of their proposed environmentally-conscious policies	1	2	3	4	☐
b. Helped clean up a local beach or stream	1	2	3	4	☐

6. **Continued.**

	No	Yes, once	Yes, twice	Yes, more than two times	Not applicable
c. Urged your place of business to take steps to operate in a more environmentally-friendly way	1	2	3	4	☐
d. Helped campaign for a political candidate because he/she supports protective environmental actions	1	2	3	4	☐
e. Signed a petition asking for increased environmental protection in and around the Lake Ontario environment	1	2	3	4	☐
f. Written a letter to a government representative expressing your opinion about an environmental program or policy	1	2	3	4	☐

7. **During the time you have lived in your current home, have you:** *(please circle one choice per item.)*

	No	Yes	Not Applicable
a. Installed or maintained one or more low-flow water faucets or shower heads	1	2	☐
b. Installed or maintained weatherproofing such as caulking, weatherstripping, storm windows, etc.	1	2	☐
c. Repaired major appliances (e.g., washer, dryer) rather than replacing them with new appliances	1	2	☐

SECTION THREE: SOME REASONS FOR YOUR ACTIONS AROUND LAKE ONTARIO

People take actions related to the environment for many different reasons. These questions will help us understand some of your reasons for taking the actions you do.

8. To what extent would each of the following factors encourage you to take actions to protect and conserve the environment around Lake Ontario? *(Please circle one choice per item.)*

	Would not encourage me at all		Would encourage me somewhat		Would encourage me strongly
a. Receiving free assistance from a trained professional in installing resource-conserving devices in my home	1	2	3	4	5
b. Receiving a reduction in my sales, property, or income taxes	1	2	3	4	5
c. Seeing that I would save money in the long-term by using resource-conserving devices (e.g., low-flow shower heads, energy efficient lightbulbs)	1	2	3	4	5
d. Having utility bills lower than what I pay now	1	2	3	4	5
e. Receiving rebates for purchasing products that conserve resources (e.g., water, energy)	1	2	3	4	5
f. Receiving low-cost loans to help buy energy-efficient homes, cars, and large household appliances	1	2	3	4	5
g. Receiving free or subsidized environmentally-friendly goods (e.g., composters, trees)	1	2	3	4	5
h. Receiving lower prices on resource-conserving devices (e.g., low-flow shower heads, energy efficient lightbulbs) compared to other devices. .	1	2	3	4	5

8. **Continued.**

	Would not encourage me at all				Would encourage me somewhat
i. Receiving a land tax rebate for committing my land to conservation uses	1	2	3	4	5
j. Having to pay fines for violating regulations related to resource conservation (e.g., fines for throwing away recyclable cans).	1	2	3	4	5

9. **There may be other factors that would encourage you to protect and conserve natural resources in the Lake Ontario environment. Please list up to 2 of these in the space provided below. Be as specific as possible.**

1. _____

2. _____

10. **Listed below are some reasons that explain why people take actions related to the Lake Ontario environment. For each item, please indicate the degree to which the reason listed corresponds to your own reasons for the actions you have taken.** *(Circle one choice for each item.)*

	Does Not Correspond At All					Moderately Corresponds	Corresponds Exactly
a. I get pleasure from contributing to a healthy environment around Lake Ontario	1	2	3	4	5	6	7
b. My friends and relatives will be upset if I don't act in an environmentally friendly way	1	2	3	4	5	6	7
c. I'd feel like I was doing the wrong thing if I didn't help protect the Lake Ontario environment	1	2	3	4	5	6	7
d. I believe helping to protect the Lake Ontario environment is a sensible thing to do	1	2	3	4	5	6	7
e. Being conscious of the Lake Ontario environment has become an important part of who I am	1	2	3	4	5	6	7

10. Continued.

	Does Not Correspond At All					Moderately Corresponds	Corresponds Exactly
f. I like the feeling I get when I do things that help protect the Lake Ontario environment	1	2	3	4	5	6	7
g. I like the recognition I get from other people when I help protect the Lake Ontario environment	1	2	3	4	5	6	7
h. I would feel guilty if I didn't do things in a way that helps protect the Lake Ontario environment	1	2	3	4	5	6	7
i. Protecting the Lake Ontario environment is the way I've chosen to contribute to a better quality of life	1	2	3	4	5	6	7
j. I believe that taking care of the Lake Ontario environment is really part of taking care of myself	1	2	3	4	5	6	7
k. I believe the quality of the environment around Lake Ontario has an effect on my personal health	1	2	3	4	5	6	7

11. Listed below are some reasons that explain why people do not take actions related to the Lake Ontario environment. For each item, please indicate the degree to which the reason listed corresponds to your own reasons for the actions you have taken. *(Circle one choice for each item.)*

	Does Not Correspond At All					Moderately Corresponds	Corresponds Exactly
a. I don't believe my personal actions do harm to the Lake Ontario environment	1	2	3	4	5	6	7
b. I don't feel that my personal actions do much to protect the Lake Ontario environment	1	2	3	4	5	6	7
c. I believe scientists will develop new technologies so there is no need to conserve natural resources (e.g., water, energy)	1	2	3	4	5	6	7

12. **Sometimes it is not possible to take all the actions you would like in order to help protect and conserve the Lake Ontario environment. How important are each of the following in <u>preventing</u> you from protecting and conserving the environment around Lake Ontario?** *(Please circle one choice per item.)*

	Not Important	Somewhat Important	Moderately Important	Very Important	Extremely Important
a. Lack of time	1	2	3	4	5
b. Personal inconvenience caused by products or actions that are good for the environment	1	2	3	4	5
c. Lack of knowledge about what actions are good for the environment	1	2	3	4	5
d. Loss of my personal freedom to choose how I live my own life	1	2	3	4	5
e. Lack of financial resources	1	2	3	4	5
f. My age	1	2	3	4	5
g. Lack of skills needed to take actions that are good for the environment	1	2	3	4	5
h. Feeling that I have a lack of influence over decisions made by environmental agencies and organizations in the Lake Ontario Basin	1	2	3	4	5
i. Lack of information about products that are good for the environment	1	2	3	4	5
j. Feeling that I should devote time and/or money to other community and social issues	1	2	3	4	5
k. Lack of approval or encouragement from my family and friends	1	2	3	4	5
l. I don't have much interest in environmental issues	1	2	3	4	5

SECTION FOUR: YOUR INTENTIONS

This section focuses on what you think you might do in the future to help protect the Lake Ontario environment.

13. Please circle the number that indicates how willing you are to do each of the following during the next year. *(If it is impossible for you to take a given action, circle "doesn't apply.")*

Then, for each action you are willing to take, check one box to indicate whether you would be willing to do that action to protect the environment, for some other reason (like saving money), or for both environmental and other reasons.

	Your level of willingness					Why would you be willing?		
	Not at all willing	Somewhat willing	Moderately willing	Very willing	Doesn't apply	To protect the environment	Other reasons	Both
Turn off the lights when no one is in a room	1	2	3	4	8	☐	☐	☐
Repair faucets that leak or drip within a day or two of noticing the leak	1	2	3	4	8	☐	☐	☐
Repair major appliances (e.g., washer, dryer) rather than replacing them with new appliances	1	2	3	4	8	☐	☐	☐
Write a letter to a government representative expressing my opinion about an environmental program or policy	1	2	3	4	8	☐	☐	☐
Install or maintain one or more low-flow water faucets or shower heads in my home	1	2	3	4	8	☐	☐	☐
Mainly use different types of transportation rather than personally driving a car (e.g., bike, walk, car pool, bus)	1	2	3	4	8	☐	☐	☐

13. Continued.

	Your level of willingness					Why would you be willing?		
	Not at all willing	Somewhat willing	Moderately willing	Very willing	Doesn't apply	To protect the environment	Other reasons	Both
Whenever a choice exists, purchase an alternative to a toxic household product	1	2	3	4	8	☐	☐	☐
Vote for political candidates because of their proposed environmentally conscious policies	1	2	3	4	8	☐	☐	☐
While brushing my teeth, turn off the water instead of letting it run	1	2	3	4	8	☐	☐	☐
Install or maintain weatherproofing in my home, such as caulking, weatherstripping, storm windows, etc.	1	2	3	4	8	☐	☐	☐
Use paper scraps for notes and memos	1	2	3	4	8	☐	☐	☐
Help campaign for a political candidate because he/she supports protective environmental actions	1	2	3	4	8	☐	☐	☐
Help clean up a local beach or stream	1	2	3	4	8	☐	☐	☐
Use low wattage energy efficient lightbulbs in my home	1	2	3	4	8	☐	☐	☐
Dispose of motor oil, grease, and chemicals at an approved waste collection site	1	2	3	4	8	☐	☐	☐
Urge my place of business to take steps to operate in a more environmentally-friendly way	1	2	3	4	8	☐	☐	☐

13. Continued.

	Your level of willingness					Why would you be willing?		
	Not at all willing	Somewhat willing	Moderately willing	Very willing	Doesn't apply	To protect the environment	Other reasons	Both
Collect shower and dishwater to use in flushing toilets instead of using fresh water	1	2	3	4	8	☐	☐	☐
During the winter, keep my thermostat at 15°C (60°F) or lower at night	1	2	3	4	8	☐	☐	☐
Sign a petition asking for increased environmental protection in and around the Lake Ontario environment	1	2	3	4	8	☐	☐	☐

14. Please indicate to what extent you agree or disagree with the following statements.

I am willing to make changes in my daily activities to help protect and conserve the Lake Ontario environment even if it means a reduction in:

	Strongly Disagree		Neutral		Strongly Agree
a. my personal level of comfort	1	2	3	4	5
b. the amount of money I have available . .	1	2	3	4	5
c. the range of choices I have in products I might want to purchase	1	2	3	4	5
d. my personal freedom	1	2	3	4	5
e. my personal convenience	1	2	3	4	5
f. the amount of time I have available for other activities.	1	2	3	4	5
g. my personal social status	1	2	3	4	5
h. my personal safety	1	2	3	4	5

14. Continued.

	Strongly Disagree		Neutral		Strongly Agree
i. my range of choices of where to work . .	1	2	3	4	5
j. my range of choices of where to live . .	1	2	3	4	5

15. How much more money per month would you be willing to pay in prices, taxes, and fees for all the goods and services you use as a consumer, if you knew that businesses and governments were using that extra money to help protect the Lake Ontario environment? *(Please check one. Note that the categories provided refer to Canadian dollars.)*

- ☐ None
- ☐ $1 to $24
- ☐ $25 to $49
- ☐ $50 to $74
- ☐ $75 to $99
- ☐ $100 to $124
- ☐ $125 to $149
- ☐ $150 to $174
- ☐ $175 to $199
- ☐ $200 to $224
- ☐ $225 to $249
- ☐ More than $250
- ☐ Don't know

SECTION FIVE: BACKGROUND INFORMATION

16. In what year were you born? _____

17. Are you male or female? ☐ Male ☐ Female

18. Besides yourself, how many adults (19 or older) live with you in your household?

_____ adults live with me in my home

19. Besides yourself, how many children (18 or younger) live with you in your household?

_____ children live with me in my home

20. Which of the following BEST describes the area where you grew up? *(Please check one.)*

- ☐ Rural, hamlet, or village (under 5,000 population)
- ☐ Town or small city of 5,000 to 24,999 population
- ☐ City of 25,000 to 99,999 population
- ☐ Large city of 100,000 population or more

21. What is your highest level of formal education? *(Check one.)*

- ☐ Primary school
- ☐ Some high school
- ☐ High school diploma
- ☐ Some college or technical school
- ☐ Completed a two-year college degree
- ☐ Completed an undergraduate degree (e.g., B.A., B.S.)
- ☐ Some graduate education
- ☐ Completed a graduate degree (e.g., M.S., Ph.D., M.D., L.L.D.)

22. Please circle your approximate 1993 TOTAL HOUSEHOLD INCOME before taxes, in Canadian dollars:

- ☐ less than $20,000
- ☐ $20,000-$29,999
- ☐ $30,000-$39,999
- ☐ $40,000-$49,999
- ☐ $50,000-$59,999
- ☐ $60,000-$69,999
- ☐ $70,000-$79,999
- ☐ $80,000-$89,999
- ☐ $90,000-$99,999
- ☐ $100,000 or more

23. How do you describe your race?

- ☐ White, not of Hispanic origin
- ☐ Hispanic
- ☐ Black or African-American
- ☐ Asian or Pacific Islander
- ☐ Native Canadian Indian/Indigenous
- ☐ Other *(please specify)*: _____

24. Which of the following BEST describes your home? *(Check one.)*

- ☐ Rented apartment, townhouse or house
- ☐ Owned/mortgaged house or condo
- ☐ Owned/mortgaged farm
- ☐ Other *(please specify)*: _____

25. Do you own or lease an automobile? *(Please check one.)*

- ☐ No
- ☐ Yes

Please use the space below for any additional comments you may wish to make.

Thank You for Your Time and Effort!

To return this questionnaire, place it in the enclosed envelope and drop it in the nearest mailbox (postage has been provided).

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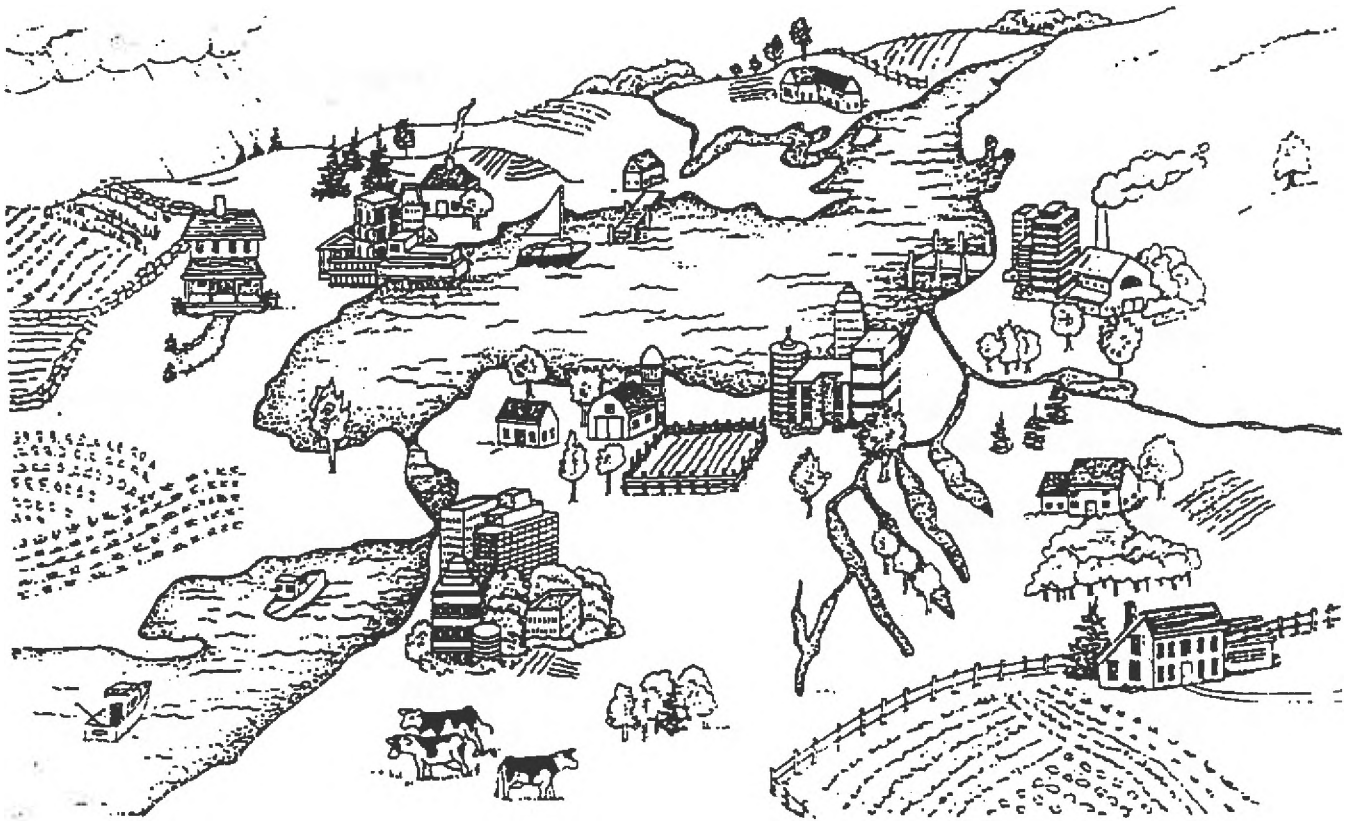
Appendix B: Key Leader Survey Instrument

OPINIONS OF ONTARIO RESIDENTS AND KEY LEADERS RELATED TO ENVIRONMENTAL QUALITY IN AND AROUND LAKE ONTARIO



Human Dimensions Research Unit
Department of Natural Resources
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Fernow Hall, Cornell University, Ithaca, N.Y. 14853

ABOUT THIS QUESTIONNAIRE

We seek your views as part of a binational effort to learn more about what people living near Lake Ontario think, feel, and do related to the environment of the Lake Ontario Basin. The purpose of the survey is to help government officials in Canada and the United States understand and consider people's beliefs, values, and behaviours as environmental policies for the Lake Ontario Basin are developed. This survey is sponsored by Health Canada and the United States Environmental Protection Agency (USEPA).

DIRECTIONS FOR COMPLETING THE QUESTIONNAIRE

- The questionnaire should be answered by the person to whom the envelope was addressed.
- Please answer each item on the questionnaire in the way that best reflects your own personal feelings, beliefs, and activities. There are no "right" or "wrong" answers.
- Please do your best to complete all items in the questionnaire. Most questions can be answered quickly and easily.
- Whenever you see an item that refers to the Lake Ontario environment, it means Lake Ontario and those portions of Ontario surrounding rivers that flow into the Lake.
- We want to hear from EVERYONE who receives this questionnaire, not just those people who are most aware of or interested in environmental issues. Your response is important to us; please complete and return your questionnaire at your earliest convenience.
- Please return the questionnaire using the addressed, pre-paid return envelope provided.

THANK YOU FOR YOUR ASSISTANCE!

SECTION ONE: YOUR OPINIONS ABOUT THE ENVIRONMENT

1. In general, how concerned are you about the following topics?

	Not At All Concerned	Somewhat Concerned	Greatly Concerned	Don't Know
a. The quality of the environment in Canada	1	2	3	☐
b. The quality of the environment in and around Lake Ontario	1	2	3	☐

2. Please circle the number that BEST represents how you would describe the quality of the natural environment in the following areas.

	Very Poor	Poor	Neither Poor Nor Good	Good	Very Good	Don't Know
a. In and around Lake Ontario	1	2	3	4	5	☐
b. In Canada as a whole	1	2	3	4	5	☐
c. The world as a whole	1	2	3	4	5	☐

3. How would you describe the quality of the environment in and around Lake Ontario today as compared to 5 years ago? *(Please check one.)*

- ☐ Very much worse
- ☐ Somewhat worse
- ☐ About the same
- ☐ Somewhat better
- ☐ Very much better
- ☐ Don't know

4. Please indicate how important each of the following is to you personally.

	Not At All Important	Moderately Important	Very Important	Extremely Important	Don't Know
a. Taking responsibility for how my actions may affect the environment	1	2	3	4	☐
b. Acting as a caretaker of the environment for future generations	1	2	3	4	☐

4. **Continued.**

	Not At All Important	Moderately Important	Very Important	Extremely Important	Don't Know
c. Limiting myself so that I use natural resources in a wise and efficient manner	1	2	3	4	☐
d. Showing a sense of respect for the earth	1	2	3	4	☐

SECTION TWO: YOUR ACTIONS AND BEHAVIOURS

Your responses to questions in this section will help us learn how often people engage in certain activities and their reasons for doing these activities.

5. **Please circle the number that indicates how often <u>in the past 12 months</u> you did each of the following activities.** *(If it was impossible for you to take a given action, circle "doesn't apply.")*

   <u>Then</u>, for each action you took at least once, check one box to indicate whether you took that action to protect the environment, for some other reason (like saving money), or for both environmental and other reasons.

	How often did you take this action?					Why did you act?		
	Never	Some or a little of the time	Often or a moderate amount of time	Most or all of the time	Doesn't apply	To protect the environment	Other reasons	Both
I turned off the lights when no one was in a room	1	2	3	4	9	☐	☐	☐
When a choice existed, I purchased an alternative to a toxic household product	1	2	3	4	9	☐	☐	☐
I repaired faucets that leaked or dripped within a day or two of when I noticed the leak	1	2	3	4	9	☐	☐	☐
I disposed of motor oil, grease, and chemicals at an approved waste collection site	1	2	3	4	9	☐	☐	☐

5. Continued.

	How often did you take this action?					Why did you act?		
	Never	Some or a little of the time	Often or a moderate amount of time	Most or all of the time	Doesn't apply	To protect the environment	Other reasons	Both
I collected shower and dishwater to use in flushing toilets instead of using fresh water	1	2	3	4	9	☐	☐	☐
I used paper scraps for notes and memos	1	2	3	4	9	☐	☐	☐
While brushing my teeth, I turned off the water instead of letting it run	1	2	3	4	9	☐	☐	☐
I used different types of transportation rather than personally driving a car (e.g., bike, walk, car-pool, bus)	1	2	3	4	9	☐	☐	☐
I used low wattage energy efficient lightbulbs in my home	1	2	3	4	9	☐	☐	☐
During the winter, I kept my thermostat at 15°C (60°F) or lower at night	1	2	3	4	9	☐	☐	☐

6. During the past 12 months, have you: *(Please circle one choice per item.)*

	No	Yes, once	Yes, twice	Yes, more than two times	Not applicable
a. Voted for political candidates because of their proposed environmentally-conscious policies	1	2	3	4	☐
b. Helped clean up a local beach or stream	1	2	3	4	☐

6. Continued.

	No	Yes, once	Yes, twice	Yes, more than two times	Not applicable
c. Urged your place of business to take steps to operate in a more environmentally-friendly way	1	2	3	4	☐
d. Helped campaign for a political candidate because he/she supports protective environmental actions	1	2	3	4	☐
e. Signed a petition asking for increased environmental protection in and around the Lake Ontario environment	1	2	3	4	☐
f. Written a letter to a government representative expressing your opinion about an environmental program or policy	1	2	3	4	☐

7. During the time you have lived in your current home, have you: *(please circle one choice per item.)*

	No	Yes	Not Applicable
a. Installed or maintained one or more low-flow water faucets or shower heads	1	2	☐
b. Installed or maintained weatherproofing such as caulking, weatherstripping, storm windows, etc.	1	2	☐
c. Repaired major appliances (e.g., washer, dryer) rather than replacing them with new appliances	1	2	☐

SECTION THREE: SOME REASONS FOR YOUR ACTIONS AROUND LAKE ONTARIO

People take actions related to the environment for many different reasons. These questions will help us understand some of your reasons for taking the actions you do.

8. To what extent would each of the following factors encourage you to take actions to protect and conserve the environment around Lake Ontario? *(Please circle one choice per item.)*

	Would not encourage me at all				Would encourage me strongly
a. Receiving free assistance from a trained professional in installing resource-conserving devices in my home	1	2	3	4	5
b. Receiving a reduction in my sales, property, or income taxes	1	2	3	4	5
c. Seeing that I would save money in the long-term by using resource-conserving devices (e.g., low-flow shower heads, energy efficient lightbulbs)	1	2	3	4	5
d. Having utility bills lower than what I pay now	1	2	3	4	5
e. Receiving rebates for purchasing products that conserve resources (e.g., water, energy)	1	2	3	4	5
f. Receiving low-cost loans to help buy energy-efficient homes, cars, and large household appliances	1	2	3	4	5
g. Receiving free or subsidized environmentally-friendly goods (e.g., composters, trees)	1	2	3	4	5
h. Receiving lower prices on resource-conserving devices (e.g., low-flow shower heads, energy efficient lightbulbs) compared to other devices.	1	2	3	4	5

8. Continued.

	Would not encourage me at all				Would encourage me somewhat
i. Receiving a land tax rebate for committing my land to conservation uses	1	2	3	4	5
j. Having to pay fines for violating regulations related to resource conservation (e.g., fines for throwing away recyclable cans)	1	2	3	4	5

9. There may be other factors that would encourage you to protect and conserve natural resources in the Lake Ontario environment. Please list up to 2 of these in the space provided below. Be as specific as possible.

1. _____

2. _____

10. Listed below are some reasons that explain why people take actions related to the Lake Ontario environment. For each item, please indicate the degree to which the reason listed corresponds to your own reasons for the actions you have taken. *(Circle one choice for each item.)*

	Does Not Correspond At All				Moderately Corresponds		Corresponds Exactly
a. I get pleasure from contributing to a healthy environment around Lake Ontario	1	2	3	4	5	6	7
b. My friends and relatives will be upset if I don't act in an environmentally friendly way	1	2	3	4	5	6	7
c. I'd feel like I was doing the wrong thing if I didn't help protect the Lake Ontario environment	1	2	3	4	5	6	7
d. I believe helping to protect the Lake Ontario environment is a sensible thing to do	1	2	3	4	5	6	7
e. Being conscious of the Lake Ontario environment has become an important part of who I am	1	2	3	4	5	6	7

10. Continued.

	Does Not Correspond At All						Corresponds Exactly
			Moderately Corresponds				
f. I like the feeling I get when I do things that help protect the Lake Ontario environment	1	2	3	4	5	6	7
g. I like the recognition I get from other people when I help protect the Lake Ontario environment	1	2	3	4	5	6	7
h. I would feel guilty if I didn't do things in a way that helps protect the Lake Ontario environment	1	2	3	4	5	6	7
i. Protecting the Lake Ontario environment is the way I've chosen to contribute to a better quality of life	1	2	3	4	5	6	7
j. I believe that taking care of the Lake Ontario environment is really part of taking care of myself	1	2	3	4	5	6	7
k. I believe the quality of the environment around Lake Ontario has an effect on my personal health	1	2	3	4	5	6	7

11. Listed below are some reasons that explain why people do not take actions related to the Lake Ontario environment. For each item, please indicate the degree to which the reason listed corresponds to your own reasons for the actions you have taken. *(Circle one choice for each item.)*

	Does Not Correspond At All						Corresponds Exactly
			Moderately Corresponds				
a. I don't believe my personal actions do harm to the Lake Ontario environment	1	2	3	4	5	6	7
b. I don't feel that my personal actions do much to protect the Lake Ontario environment	1	2	3	4	5	6	7
c. I believe scientists will develop new technologies so there is no need to conserve natural resources (e.g., water, energy)	1	2	3	4	5	6	7

12. **Sometimes it is not possible to take all the actions you would like in order to help protect and conserve the Lake Ontario environment. How important are each of the following in preventing you from protecting and conserving the environment around Lake Ontario?** *(Please circle one choice per item.)*

	Not Important	Somewhat Important	Moderately Important	Very Important	Extremely Important
a. Lack of time	1	2	3	4	5
b. Personal inconvenience caused by products or actions that are good for the environment	1	2	3	4	5
c. Lack of knowledge about what actions are good for the environment	1	2	3	4	5
d. Loss of my personal freedom to choose how I live my own life	1	2	3	4	5
e. Lack of financial resources	1	2	3	4	5
f. My age	1	2	3	4	5
g. Lack of skills needed to take actions that are good for the environment	1	2	3	4	5
h. Feeling that I have a lack of influence over decisions made by environmental agencies and organizations in the Lake Ontario Basin	1	2	3	4	5
i. Lack of information about products that are good for the environment	1	2	3	4	5
j. Feeling that I should devote time and/or money to other community and social issues.	1	2	3	4	5
k. Lack of approval or encouragement from my family and friends	1	2	3	4	5
l. I don't have much interest in environmental issues	1	2	3	4	5

SECTION FOUR: YOUR INTENTIONS

This section focuses on what you think you might do in the future to help protect the Lake Ontario environment.

13. **Please circle the number that indicates how willing you are to do each of the following during the next year.** *(If it is impossible for you to take a given action, circle "doesn't apply.")*

Then, for each action you are willing to take, check one box to indicate whether you would be willing to do that action to protect the environment, for some other reason (like saving money), or for both environmental and other reasons.

	Your level of willingness					Why would you be willing?		
	Not at all willing	Somewhat willing	Moderately willing	Very willing	Doesn't apply	To protect the environment	Other reasons	Both
Turn off the lights when no one is in a room	1	2	3	4	8	☐	☐	☐
Repair faucets that leak or drip within a day or two of noticing the leak	1	2	3	4	8	☐	☐	☐
Repair major appliances (e.g., washer, dryer) rather than replacing them with new appliances	1	2	3	4	8	☐	☐	☐
Write a letter to a government representative expressing my opinion about an environmental program or policy	1	2	3	4	8	☐	☐	☐
Install or maintain one or more low-flow water faucets or shower heads in my home	1	2	3	4	8	☐	☐	☐

13. Continued.

	Your level of willingness					Why would you be willing?		
	Not at all willing	Somewhat willing	Moderately willing	Very willing	Doesn't apply	To protect the environment	Other reasons	Both
Mainly use different types of transportation rather than personally driving a car (e.g., bike, walk, car pool, bus)	1	2	3	4	8	☐	☐	☐
Whenever a choice exists, purchase an alternative to a toxic household product	1	2	3	4	8	☐	☐	☐
Vote for political candidates because of their proposed environmentally conscious policies	1	2	3	4	8	☐	☐	☐
While brushing my teeth, turn off the water instead of letting it run	1	2	3	4	8	☐	☐	☐
Install or maintain weatherproofing in my home, such as caulking, weatherstripping, storm windows, etc.	1	2	3	4	8	☐	☐	☐
Use paper scraps for notes and memos	1	2	3	4	8	☐	☐	☐
Help campaign for a political candidate because he/she supports protective environmental actions	1	2	3	4	8	☐	☐	☐
Help clean up a local beach or stream	1	2	3	4	8	☐	☐	☐
Use low wattage energy efficient lightbulbs in my home	1	2	3	4	8	☐	☐	☐

13. Continued.

	Your level of willingness					Why would you be willing?		
	Not at all willing	Somewhat willing	Moderately willing	Very willing	Doesn't apply	To protect the environment	Other reasons	Both
Dispose of motor oil, grease, and chemicals at an approved waste collection site	1	2	3	4	8	☐	☐	☐
Urge my place of business to take steps to operate in a more environmentally-friendly way	1	2	3	4	8	☐	☐	☐
Collect shower and dishwater to use in flushing toilets instead of using fresh water	1	2	3	4	8	☐	☐	☐
During the winter, keep my thermostat at 15°C (60°F) or lower at night	1	2	3	4	8	☐	☐	☐
Sign a petition asking for increased environmental protection in and around the Lake Ontario environment	1	2	3	4	8	☐	☐	☐

14. Please indicate to what extent you agree or disagree with the following statements.

I am willing to make changes in my daily activities to help protect and conserve the Lake Ontario environment even if it means a reduction in:

	Strongly Disagree		Neutral		Strongly Agree
a. my personal level of comfort	1	2	3	4	5
b. the amount of money I have available . .	1	2	3	4	5
c. the range of choices I have in products I might want to purchase	1	2	3	4	5

14. **Continued.**

	Strongly Disagree		Neutral		Strongly Agree
d. my personal freedom	1	2	3	4	5
e. my personal convenience	1	2	3	4	5
f. the amount of time I have available for other activities.	1	2	3	4	5
g. my personal social status	1	2	3	4	5
h. my personal safety	1	2	3	4	5
i. my range of choices of where to work . .	1	2	3	4	5
j. my range of choices of where to live . .	1	2	3	4	5

15. **How much more money per month would you be willing to pay in prices, taxes, and fees for all the goods and services you use as a consumer, if you knew that businesses and governments were using that extra money to help protect the Lake Ontario environment?** *(Please check one. Note that the categories provided refer to Canadian dollars.)*

- ☐ None
- ☐ $1 to $24
- ☐ $25 to $49
- ☐ $50 to $74
- ☐ $75 to $99
- ☐ $100 to $124
- ☐ $125 to $149
- ☐ $150 to $174
- ☐ $175 to $199
- ☐ $200 to $224
- ☐ $225 to $249
- ☐ More than $250
- ☐ Don't know

SECTION FIVE: YOUR PERCEPTIONS OF BASIN RESIDENTS

16. Please circle the number that indicates how often in the past 12 months you think the average Basin resident did each of the following activities.

Then, for each action you think the average resident took at least once, check one box to indicate whether he/she took that action to protect the environment, for some other reason (like saving money), or for both environmental and other reasons.

	How often did people take this action?				Why did they act?		
	Never	Some or a little of the time	Often or a moderate amount of time	Most or all of the time	To protect the environment	Other reasons	Both
Used low wattage energy efficient lightbulbs in their homes	1	2	3	4	☐	☐	☐
Turned off the lights when no one was in a room	1	2	3	4	☐	☐	☐
Used different types of transportation rather than personally driving a car (e.g., bike, walk, car-pool, bus)	1	2	3	4	☐	☐	☐
During the winter, kept their thermostats at 15°C (60°F) or lower at night	1	2	3	4	☐	☐	☐

17. Do you think the average resident of the Lake Ontario Basin has installed or currently maintains weatherproofing such as caulking, weatherstripping, storm windows, etc. in his/her home?

☐ NO

☐ YES

18. **To what extent do you believe each of the following factors would encourage Basin residents to take actions to protect and conserve the environment around Lake Ontario?** *(Please circle one choice per item.)*

	Would not encourage them at all		Would encourage them somewhat		Would encourage them strongly
a. Receiving low-cost loans to help them buy energy-efficient homes, cars, and large household appliances	1	2	3	4	5
b. Seeing that they would save money in the long-term by using resource-conserving devices (e.g., low-flow shower heads, energy efficient lightbulbs)	1	2	3	4	5
c. Receiving a land tax rebate for committing their land to conservation uses	1	2	3	4	5
d. Receiving free or subsidized environmentally-friendly goods (e.g., composters, trees)	1	2	3	4	5
e. Receiving free assistance from a trained professional in installing resource-conserving devices in their homes	1	2	3	4	5
f. Having utility bills lower than what they pay now	1	2	3	4	5
g. Having to pay fines for violating regulations related to resource conservation (e.g., fines for throwing away recyclable cans)	1	2	3	4	5
h. Receiving rebates for purchasing products that conserve resources (e.g., water, energy)	1	2	3	4	5
i. Receiving a reduction in their sales, property, or income taxes	1	2	3	4	5
j. Receiving lower prices on resource-conserving devices (e.g., low-flow shower heads, energy efficient lightbulbs) compared to other devices	1	2	3	4	5

19. How important do you think each of the following are in preventing Basin residents from protecting and conserving the environment around Lake Ontario? *(Please circle one choice per item.)*

	Not Important	Somewhat Important	Moderately Important	Very Important	Extremely Important
a. Feeling they lack influence over decisions made by environmental agencies and organizations in the Lake Ontario Basin	1	2	3	4	5
b. Lack of skills needed to take actions that are good for the environment	1	2	3	4	5
c. They don't have much interest in environmental issues	1	2	3	4	5
d. Their age	1	2	3	4	5
e. Feeling like they should devote time and/or money to other community and social issues.	1	2	3	4	5
f. Lack of approval or encouragement from their family and friends	1	2	3	4	5
g. Lack of knowledge about what actions are good for the environment	1	2	3	4	5
h. Personal inconvenience caused by products or actions that are good for the environment	1	2	3	4	5
i. Lack of financial resources	1	2	3	4	5
j. Lack of time	1	2	3	4	5
k. Lack of information about products that are good for the environment	1	2	3	4	5
l. Loss of their personal freedom to choose how they live their own lives	1	2	3	4	5

20. **How much more money per month do you believe the average Basin resident would be willing to pay in prices, taxes, and fees for all the goods and services he/she uses as a consumer, if businesses and governments were using that extra money to help protect the Lake Ontario environment?** *(Please check one.)*

- ☐ None
- ☐ $1 to $24
- ☐ $25 to $49
- ☐ $50 to $74
- ☐ $75 to $99
- ☐ $100 to $124
- ☐ $125 to $149
- ☐ $150 to $174
- ☐ $175 to $199
- ☐ $200 to $224
- ☐ $225 to $249
- ☐ More than $250
- ☐ Don't know

SECTION SIX: BACKGROUND INFORMATION

21. **In what year were you born?** _____

22. **Are you male or female?** ☐ Male ☐ Female

23. **Besides yourself, how many adults (19 or older) live with you in your household?**

_____ adults live with me in my home

24. **Besides yourself, how many children (18 or younger) live with you in your household?**

_____ children live with me in my home

25. **Which of the following BEST describes the area where you grew up?** *(Please check one.)*

- ☐ Rural, hamlet, or village (under 5,000 population)
- ☐ Town or small city of 5,000 to 24,999 population
- ☐ City of 25,000 to 99,999 population
- ☐ Large city of 100,000 population or more

26. What is your highest level of formal education? *(Check one.)*

- ☐ Primary school
- ☐ Some high school
- ☐ High school diploma
- ☐ Some college or technical school
- ☐ Completed a two-year college degree
- ☐ Completed an undergraduate degree (e.g., B.A., B.S.)
- ☐ Some graduate education
- ☐ Completed a graduate degree (e.g., M.S., Ph.D., M.D., L.L.D.)

27. Please circle your approximate 1993 TOTAL HOUSEHOLD INCOME before taxes, in Canadian dollars:

- ☐ less than $20,000
- ☐ $20,000-$29,999
- ☐ $30,000-$39,999
- ☐ $40,000-$49,999
- ☐ $50,000-$59,999
- ☐ $60,000-$69,999
- ☐ $70,000-$79,999
- ☐ $80,000-$89,999
- ☐ $90,000-$99,999
- ☐ $100,000 or more

28. How do you describe your race?

- ☐ White, not of Hispanic origin
- ☐ Hispanic
- ☐ Black or African-American
- ☐ Asian or Pacific Islander
- ☐ Native American
- ☐ Other *(please specify)*: _____

29. Which of the following BEST describes your home? *(Check one.)*

- ☐ Rented apartment, townhouse or house
- ☐ Owned/mortgaged house or condo
- ☐ Owned/mortgaged farm
- ☐ Other *(please specify)*: _____

30. Do you own or lease an automobile? *(Please check one.)*

- ☐ No
- ☐ Yes

31. Which of the following BEST describes your profession? *(Please check one.)*

- ☐ *Educator*
  (i.e., a principal, education board member, or part or full-time teacher at the primary through university level)
- ☐ *Business person*
  (e.g., employment in a private sector business, service on a local chamber of commerce)
- ☐ *Paid staff in a nongovernment environmental organization*
  (e.g., paid staff member of a group like the Nature Conservancy)
- ☐ *Environmental scientist*
  (i.e., part or full-time employment at a private sector, government, or university institution conducting research related to the environment)
- ☐ *Government employee*
  (i.e., an appointed or elected government official, or a part or full-time employee of a local, provincial or national government agency)
- ☐ *None of the above (please describe your profession:* _____)

32. Are you currently a member of any nonpaid citizen advisory group established by a local, provincial, or national government agency?

- ☐ No
- ☐ Yes ➡ Please describe: _____

_____

Please use the back page for any additional comments you may wish to make.

Thank You for Your Time and Effort!

To return this questionnaire, place it in the enclosed envelope and drop it in the nearest mailbox (postage has been provided).

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Appendix C. Pelletier's conceptualization of motivation (Pelletier et al. 1993).

Domain Label	Domain Description
Intrinsic motivation	Engaged in stewardship behaviors purely for the satisfaction derived from those behaviors
External regulation	Extrinsic motivation: behavior performed because of an external system of reward, punishment, or constraint.
Introjection	Extrinsic motivation: a formerly external motivation now internalized as feelings of guilt, anxiety, self-esteem, etc.
Identification	Extrinsic motivation: behavior performed because it is congruent with the actor's values and goals.
Integration	Extrinsic motivation: behavior performed not only because it is congruent with the actor's values and goals, but also because it has become part of the actor's sense of identity, how he/she defines who he/she is.
Amotivation	Actor doesn't really know why she did the activity because she sees no particular connection between her behavior and related outcomes; she can't give a clear explanation for her actions because she doesn't feel like her actions can really change things.

Appendix D. Definition of stewardship commitment levels.

Level	Stewardship Activity Requirements at this Commitment Level
1	Activities require little money, time, or effort.
2	Activities require slight monetary expenditure and/or some time and effort initially, but no user action is necessary over the long-term.
3	Activities require slight monetary expenditure and/or some time and effort over the long-term.
4	Activities are relatively expensive in terms of money, time and effort initially, but no user action is necessary over the long-term.
5	Activities are relatively expensive in terms of money, time and effort over the long-term.

Appendix E1. Stewardship behavior items related to water conservation.

Stewardship Commitment Level	Item Description
1	While brushing my teeth, I turned off the water instead of letting it run.
2	I installed or maintained one or more low-flow water faucets or shower heads in my home.
3	I repaired faucets that leaked or dripped within a day or two of when I noticed the leak.
4	I helped clean up a local beach or stream.
5	I collected shower and dishwater to use in flushing toilets instead of using fresh water.

Appendix E2. Stewardship behavior items related to energy conservation.

Stewardship Commitment Level	Item Description
1	I turned off the lights when no one was in a room.
2	I used low wattage energy efficient light bulbs in my home.
3	During the winter, I kept my thermostat at 15°c (60°f) or lower at night.
4	I installed or maintained weatherproofing such as caulking, weatherstripping, storm windows, etc.
5	I used different types of transportation rather than personally driving a car (e.g., bike, walk, car-pool, bus).

Appendix E3. Stewardship behavior items related to product purchase and disposal.

Stewardship Commitment Level	Item Description
1	I used paper scraps for notes and memos.
2	I disposed of motor oil, grease, and chemicals at an approved waste collection site.
3	When a choice existed, I purchased alternatives to a toxic household product (Level 3 if low frequency).
4	I repaired major appliances (e.g., washer, dryer) rather than replacing them with new appliances.
5	When a choice existed, I purchased alternatives to a toxic household product (Level 5 if high frequency).

Appendix E4. Stewardship behavior items related to political involvement.

Stewardship Commitment Level	Item Description
1	I signed a petition asking for increased environmental protection in and around the Lake Ontario environment.
2	I voted for political candidates because of their proposed environmentally-conscious policies.
3	I urged my place of business to take steps to operate in a more environmentally-friendly way.
4	I wrote a letter to a government representative expressing my opinion about an environmental program or policy.
5	I helped campaign for a political candidate because he/she supports protective environmental actions.

Appendix F: Guidance for Identifying Key Leaders

New York State College of Agriculture and Life Sciences
a Statutory College of the State University
Cornell University

Department of Natural Resources
Fernow Hall, Ithaca, N. Y. 14853-3001

Fishery Science
Forest Science
Wildlife Science
Natural Resources
Resource Policy
and Planning
Aquatic Science

MEMO TO: Binational Advisory Committee

FROM: Barbara Knuth, Danielle Dixon, Bill Siemer

RE: Your help identifying key leaders

DATE: 11 February 1994

Enclosed is a summary of our December meeting for your records. In the future, we may ask you to refer back to the December meeting summary so please keep it on file. We are currently working on a literature review and beginning to identify potential items for the measurement instrument. We seek your help in identifying the sample of key leaders who will be asked to participate in our pilot test.

Guidance for Identifying Key Leaders

Please review the following and begin compiling lists of key leaders as we discussed at the December meeting. We would like to have all information from you by April 1, 1994. For each leader, we need name and address, telephone number if available, and organization affiliation if it is not obvious from the address.

As you compile your lists of key leaders for our use in the pilot survey, please keep careful documentation of the methods you use:

1. Please note from which database you have drawn your information (e.g., educators who have participated in Health Canada workshops in last year).

2. Please note how you select the names you send from each (large) database (e.g., if you have a database of 1,000 educators in New York State, please note how you select the names you send -- the first twenty on the list?; randomly selected?; those most active in the past and so most likely to participate in the pilot effort). Remember we are using this pilot test as a method of developing and refining the technique to measure stewardship -- having a random sample of key leaders is not that important. Having key leaders from a variety of areas who are likely to give us good feedback is important.

3. Do not limit key leaders only to those who are presumed to be good stewards and/or environmentally-friendly. We wish to include a variety of philosophies and levels of commitment to Lake Ontario stewardship.

4. We will need 300 key leader names in Canada, 300 in the U.S. to represent the following areas. Please indicate on your lists of key leaders into which category the names you provide fall:

    a. business (e.g., manufacturing industries, chambers of commerce)

    b. environmental groups

    c. scientists (university, government sector, private sector)

    d. educators (elementary through higher education)

    e. government (local, county, province/state, federal)

        - civil service
        - political appointments
        - elected

5. Key leaders need not be resident in the Lake Ontario Basin, rather their actions or influence must have the potential to affect the Lake Ontario ecosystem, including any political jurisdiction that is 1/2 or more in the Lake Ontario watershed, including the Niagara River watershed.

6. Lois and Jennifer, please aim for providing as many of the 300 key leader names in each country as you can, since we do not know how many names other Advisory Committee members will be able to provide. In your positions, you (Lois and Jennifer) are probably most likely to have these kinds of lists available. In case we can identify more than the 300 needed, please indicate with and asterisk whose who you feel would be particularly important to include, if possible.

7. Nina-Marie, Lester, and Sally, please assist in this task as you are able. Please call Barb if you have questions about how you can help.

8. Please send your lists of key leaders to Barb by April 1, 1994. Please call (Barb at 607-539-6635; Danielle at 607-272-7417 or Internet:DOD1@Cornell.Edu) if you have any questions. We realize that each of you may be able to provide different types of lists -- e.g., Nina-Marie indicated she could provide some environmental/citizen group contacts and possibly some local government contacts, but probably not federal, etc. This is fine -- please send what you can for the variety of key leaders we are seeking. If we come up short in any area, we will be in touch with the Advisory Committee for suggestions on how to identify key leaders in areas we lack.

Thanks very much for your help. This continues to be an exciting project, thanks in part to your assistance. Hope you enjoy the rest of the winter -- our local groundhog saw his shadow, so we're in for at least six more weeks of this white stuff!

Appendix G: Descriptions of Scoring Systems for Behavior Items

Score Name	Formula*	Description of Score
Chosen Score	$B = \sum f_i \cdot c_i$	Respondents who answered "never", "no", "doesn't apply", or "not applicable" received a score of 0 for that item. For questions 5 and 6, response choices 2, 3, and 4 were recoded as 1, 2, or 3 respectively, then multiplied by the item commitment level (from 1 to 5). For question 7, respondents who had engaged in the activity received a score equal to 3 times the item commitment level.
Presence vs. Absence	$B=\sum c_i$ (for $f_i>0$)	Respondents who answered "never", "no", "doesn't apply", or "not applicable" receive a score of 0 for that item. If respondent engaged in the behavior at any frequency level, he/she receives a score for that item equal to the item commitment level (1 to 5).
Basic Frequency	$B=\sum f_i$	Respondents who answered "never", "no", "doesn't apply", or "not applicable" receive a score of 0 for that item. For items in Questions 5 and 6, response choices 2, 3, and 4 were recoded as 1, 2, or 3 respectively. For Question 7, respondents who circled "yes" received a score of 3.
Threshold	$B =$ $(\sum c_1$ (for $f_i=4))$ + $(\sum c_{2a}$ (for $f_i\geq3))$ + $(\sum c_{2b}$ (for $f_i=2))$ + $(\sum c_3$ (for $f_i\geq3))$ + $(\sum c_{4a}$ (for $f_i\geq2))$ + $(\sum c_{4b}$ (for $f_i=2))$ + $(\sum c_5$ (for $f_i\geq2))$	Respondents who answered "never", "no", "doesn't apply", or "not applicable" receive a score of 0. If the respondent meets a predetermined threshold level, he/she receives a score equal to the item commitment level.

Level	Threshold
1	Question 5: "4: most or all of the time"
	Question 6: "4: Yes, more than 2 times"
2	Question 5: "3: often or a moderate amount of time" *or* "4: most or all of the time"
	Question 6: "3: Yes, twice" *or* "4: Yes, more than 2 times"
	Question 7: "2: Yes"
3	Question 5: "3: often or a moderate amount of time" *or* "4: most or all of the time"
	Question 6: "3: Yes, twice" *or* "4: Yes, more than 2 times"
4	Question 5: "2: some or a little of the time" *or* "3: often or a moderate amount of time" *or* "4: most or all of the time"
	Question 6: "2: Yes, once" *or* "3: Yes, twice" *or* "4: Yes, more than 2 times"
	Question 7: "2: Yes"
5	Question 5: "2: some or a little of the time" *or* "3: often or a moderate amount of time" *or* "4: most or all of the time"
	Question 6: "2: Yes, once" *or* "3: Yes, twice" *or* "4: Yes, more than 2 times"

Appendix G: Cont.

*Key to mathematical formulas

B = behavior

c_i = commitment level (ranges from 1 to 5)

c_1 = commitment level 1

c_{2a} = comitment level 2, when items are in Question 5 or 6

c_{2b} = commitment level 2, when items are in Question 7

c_3 = commitment level 3

c_{4a} = commitment level 4 for items in Question 5 or 6

c_{4b} = commitment level 4 for items in Question 7

c_5 = commitment level 5

f_i = frequency of behavior (ranges from "never" to "most or all of the time" for Question 5; ranges from "no" to "yes, more than two times" for Question 6; ranges from "yes" to "no" for Question 7)

Appendix H: Descriptions of Scoring Systems for Intentions Items

Score Name	Formula*	Description of Score
Chosen Score	$I = \sum g_i \cdot c_i$	Respondents who answered "not at all willing" or "doesn't apply" received a score of 0 for that item. Response choices 2, 3, and 4 were recoded as 1, 2, or 3 respectively, then multiplied by the item commitment level (from 1 to 5).
Presence vs. Absence	$I=\sum c_i$ (for $g_i>0$)	Individuals who answered "not at all willing" or doesn't apply" were excluded (i.e., given a score of 0). If respondent is willing at any level to do the behavior, he/she is given a score for that item equal to the item commitment level.
Basic Frequency	$I=\sum g_i$	Individuals who answered "not at all willing" or "doesn't apply" were excluded (i.e., given a score of 0). Response choices 2, 3, and 4 were recoded as 1, 2, or 3 respectively.
Threshold	$I=(\sum c_1 (f_i \geq 4)) + (\sum c_2 (f_i \geq 3)) + (\sum c_3 (f_i \geq 3)) + (\sum c_4 (f_i \geq 2)) + (\sum c_5 (f_i \geq 2))$	Respondents who answered "never", "no", "doesn't apply", or "not applicable" receive a score of 0. If the respondent meets a predetermined threshold level, he/she receives a score equal to the item commitment level.

Level	Threshold
1	"4: very willing"
2	"3: moderately willing" *or* "4: very willing"
3	"3: moderately willing" *or* "4: very willing"
4 very	"2: somewhat willing" *or* "3: moderately willing" *or* "4: willing"
5 very	"2: somewhat willing" *or* "3: moderately willing" *or* "4: willing"

*Key to mathematical formulas

I = intention
c_i = commitment level (ranges from 1 to 5)
c_1 = commitment level 1
c_2 = commitment level 2
c_3 = commitment level 3
c_4 = commitment level 4
c_5 = commitment level 5
g_i = willingness to engage in stewardship behavior (ranges from "somewhat willing" to "very willing")

Appendix I: Advantages and Disadvantages of Scoring Systems for Behaviors and Intentions Items

Score Name	Advantages	Disadvantages
Chosen Score	Takes into account commitment levels and frequencies; differentiates between frequencies of behaviors, and between respondents' willingness to engage in behaviors	Somewhat complicated to calculate and explain
Presence vs. Absence	Takes into account commitment levels; fairly straightforward to calculate	Does not differentiate between different frequencies of behaviors or different levels of willingness to take actions
Basic Frequency	Takes into account frequencies; simplest score to calculate and explain	Does not take into account the 5 commitment levels
Threshold	Differentiates between frequencies of behaviors and between respondents' willingness to engage in behaviors; takes into account commitment levels	Most difficult score to calculate and explain; many assumptions enter into this score (regarding selection of reasonable threshold levels)

Appendix J1. Urban/rural background of residents and key leaders in Ontario, Canada.

Residence Area During Childhood	Residents (n=250)	Key Leaders (n=236)	X^2	P value
Rural hamlet or village (under 5,000 population)	25.2	19.9	22.13	<0.001
Town or small city (5,000 to 24,999 population)	26.8	13.6		
City of 25,000 to 99,999 population	20.4	21.6		
Large city (100,000 or more in population)	27.6	44.9		

Appendix J2. Attained education level of residents and key leaders in Ontario, Canada.

Level of Education	Residents (n=251)	Key Leaders (n=234)	X^2	P value
Primary school	4.8	0.0	196.85	<0.001
Some high school	15.9	0.9		
High school diploma	19.9	3.0		
Some college or technical school	24.7	5.1		
Completed a two-year college degree	8.8	4.3		
Completed an undergraduate degree (e.g., B.A., B.S.)	11.6	22.6		
Some graduate education	5.2	12.0		
Completed a graduate degree (e.g., M.S., Ph.D., M.D., L.L.D)	9.2	52.1		

Appendix J3. Income of residents and key leaders in Ontario, Canada.

Income (Canadian Dollars)	Residents (n=225)	Key Leaders (n=223)	X^2	P value
Less than $20,000	13.8	3.1	108.54	<0.001
$20,000-$29,999	18.7	4.0		
$30,000-$39,999	8.4	4.9		
$40,000-$49,999	9.8	8.1		
$50,000-$59,999	12.4	4.1		
$60,000-$69,999	13.3	8.5		
$70,000-$79,999	5.3	8.5		
$80,000-$89,999	7.6	7.2		
$90,000-$99,999	1.8	11.2		
$100,000 or more	8.9	39.5		

Appendix J4. Race of residents and key leaders in Ontario, Canada.

Race	Residents (n=225)	Key Leaders (n=223)	X^2	P value
White, not of Hispanic origin	90.4	93.5	5.34	0.375
Hispanic	1.2	0.9		
Black or African-American	0.8	0.0		
Asian or Pacific Islander	2.8	3.0		
Native Canadian Indian/Indigenous	2.4	0.4		
Other	2.4	2.2		

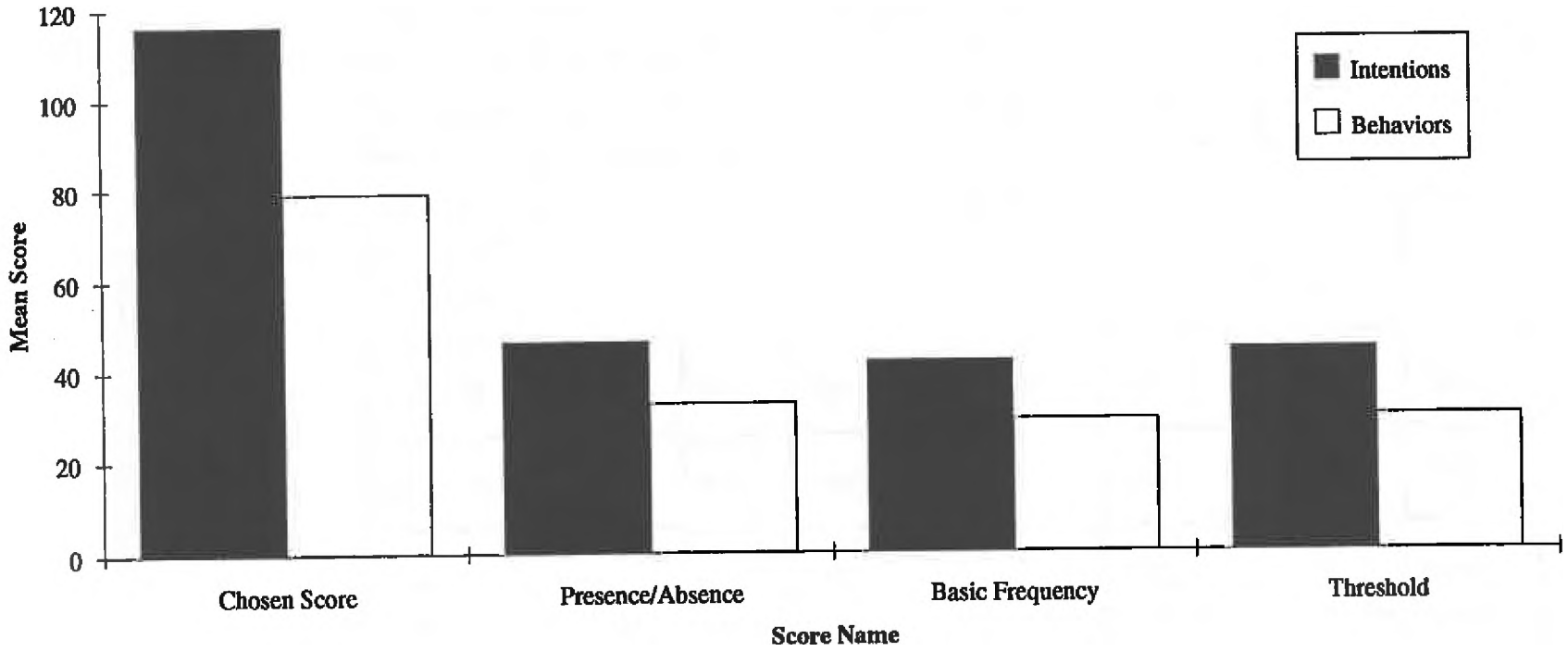
Appendix K. Reliability analysis of stewardship motivators index.

n	# of items	Alpha	Item to remove to improve alpha
457	14	0.8403	11a
457	13	0.8676	11b
458	12	0.8943	11c
460	11	0.9112	10b
460	10	0.9152	10g
460	9	0.9173	none

Appendix L: Summary Statistics for Alternative Scoring Systems for Behaviors and Intentions Items[1]

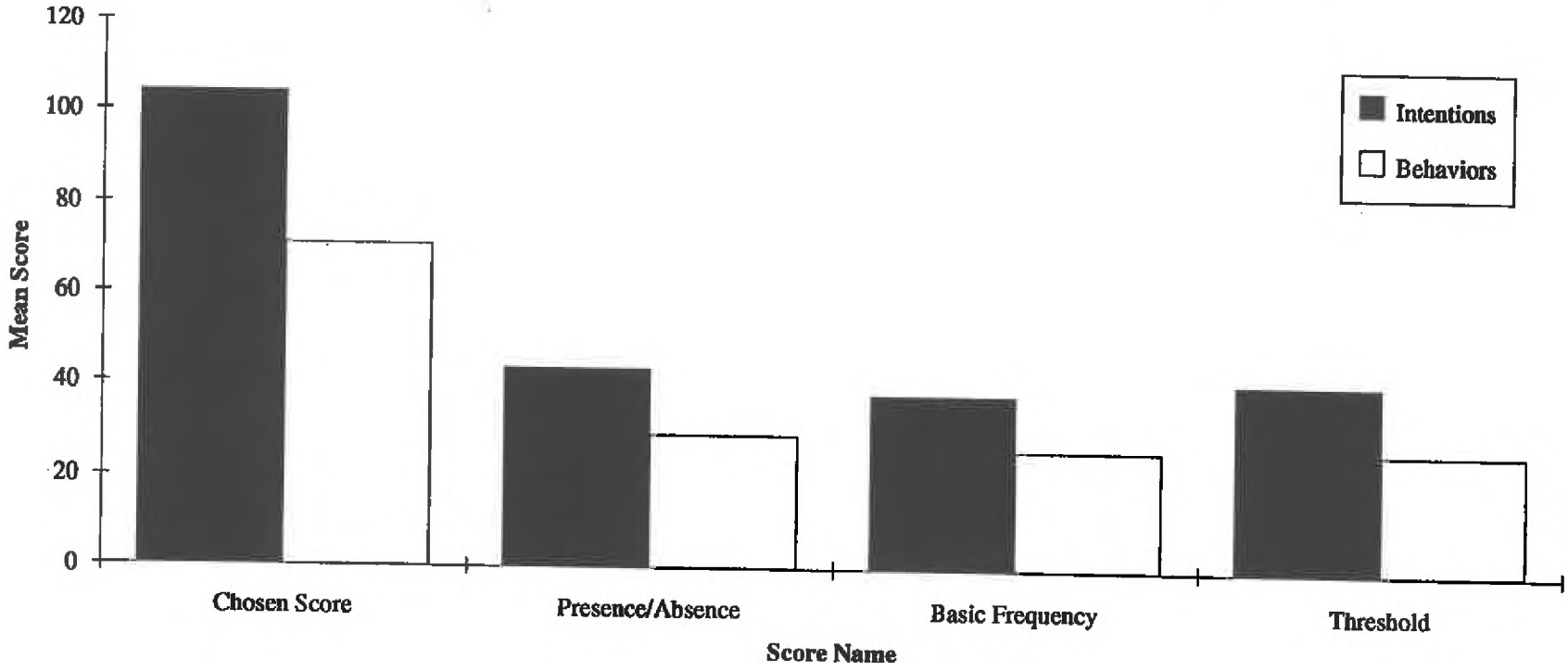
Concept Area	Name of Alternative Score	Respondent Group	Actual Range	Mean	S.E.	Mode	Median	Skewness	Kurtosis	% Missing	P-value
Behaviors	#1: Presence vs. Absence	Residents	9-52	29.3	0.55	28.0	29.0	0.03	-0.23	12.9%	< 0.001
		Key Leaders	13-57	32.7	0.56	30.0	32.5	0.18	-0.14	12.9%	
	#2: Basic Frequency	Residents	6-39	26.4	0.46	24.0	27.0	-0.00	-0.10	12.9%	< 0.001
		Key Leaders	7-50	29.1	0.53	26.0	29.0	0.26	0.35	12.9%	
	#3: Threshold	Residents	7-50	26.5	0.53	30.0	26.0	0.24	-0.03	12.9%	< 0.001
		Key Leaders	9-57	29.5	0.58	27.0	29.0	0.40	0.28	12.9%	
Intentions	#1: Presence vs. Absence	Residents	8-57	43.5	0.68	52.0	45.0	-0.79	0.34	10.6%	0.001
		Key Leaders	5-57	46.4	0.59	52.0	47.0	-1.30	3.25	10.6%	
	#2: Basic Frequency	Residents	6-57	38.1	0.64	42.0	39.0	-0.50	0.28	10.6%	< 0.001
		Key Leaders	5-57	41.9	0.60	41.0	42.0	-0.84	1.69	10.6%	
	#3: Threshold	Residents	7-57	41.0	0.70	57.0	42.0	-0.60	-0.03	10.6%	< 0.001
		Key Leaders	5-57	44.4	0.63	57.0	45.0	-1.01	1.86	10.6%	

[1]The possible range for each score is from 0-57; the mid-range value for each score is 28.5.



Appendix M. Comparison of Key Leaders' Scores for Intentions and Behaviors.

Appendix I: Comparison of Residents' Scores for Intentions and Behaviors



Appendix N. Comparison of Residents' Scores for Intentions and Behaviors.

Appendix O. Reliability analysis of incentives index.

n	# of items	Alpha	Item to remove to improve alpha
443	10	0.869	8j
445	9	0.873	8i
466	8	0.875	8f
467	7	0.878	none